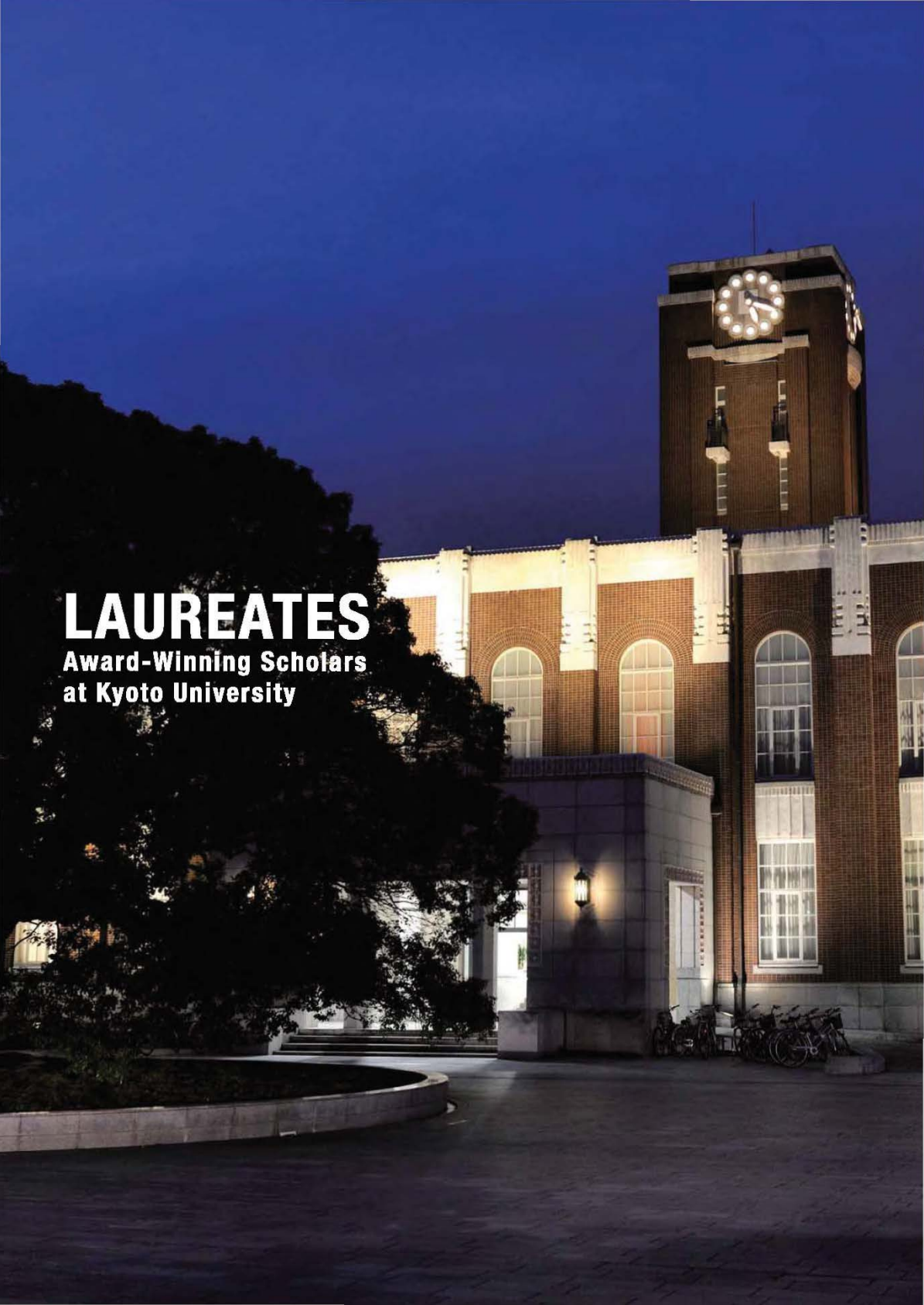
# LAUREATES

## Award-Winning Scholars at Kyoto University 1949 - 2013

Hideki Yukawa
Sin-itiro Tomonaga
Kenichi Fukui
Susumu Tonegawa
Ryoji Noyori
Toshihide Maskawa
Makoto Kobayashi
Shinya Yamanaka
Kiyosi Itô
Osamu Hayaishi
Mikio Sato
Heisuke Hironaka
Yoshio Masui
Yasutomi Nishizuka
Shigefumi Mori
Chushiro Hayashi
Masatoshi Nei
Kimishige Ishizaka
Makoto Nagao
Masatoshi Takeichi
Denis Le Bihan
Makoto Kumada
Suco Kawabata
Huzihiro Araki
Tetsuya Sato
Hiroshi Matsumoto
Kohei Tamao
Satoru Fujishige
Tamio Hayashi
Tetsuji Miwa
Kazuyuki Hirao
Susumu Kitagawa
Mitsuo Sawamoto
Keiji Maruoka
Mitsuhiro Shishikura
Hiraku Nakajima
Hiroshi Oguri
Shin-ichi Matsumoto
Tokindo S. Okada
Shigetada Nakanishi
Koichi Tanaka
Tasuku Honjo
Ken-ichi Inui
Yoshinori Fujiyoshi
Kenji Kangawa
Shigekazu Nagata
Shuh Narumiya
Mitsuru Hashida
Shimon Sakaguchi
Kazutoshi Mori
Junichiro Itani
Yoneo Ishii
Toshisada Nishida
Kazuyoshi Yoshikawa
Kenichiro Osumi
Hisateru Mitsuda
Tadao Umesao
Kazuhiko Nishijima
Toshio Sawada
Yorio Hinuma
Mitsuhiro Yanagida
Yasuyuki Yamada
Susumu Fuma
Kazuya Kato
Keiji Morokuma
Tohru Eguchi

KYOTO UNIVERSITY



# LAUREATES

## Award-Winning Scholars at Kyoto University

# Contents

# President's Message

Kyoto University was established in 1897 as the second imperial university in Japan. Located in the Yoshida district, near Mount Hiei and the Kamogawa River, the university developed a unique brand of scholarship, cultivated an outstanding pool of knowledge and talent, and became one of Japan's foremost academic centers. That legacy has continued to the present day. Over 110 years since its founding, Kyoto University's domestic and international presence as a leading research institution has continued to develop and spread geographically to locations such as Uji Campus, Katsura Campus, the Research Reactor Institute in Osaka Prefecture's Kumatori, and the Primate Research Institute in Inuyama, Aichi Prefecture.

As in the past, the students and scholars gathered on Yoshida Campus today share a common characteristic: they are driven by a yearning to search for the truth and a respect for academic freedom. Those qualities are reflected in their innovative approaches to research, and in the results that they yield.

This publication introduces a partial selection of the Kyoto University-affiliated scholars whose research has been acknowledged by prestigious international awards. Although the awards are bestowed for achievements that have already been made, they are given in anticipation of the contribution that the work will bring in the future. Compiling this selection of the awards garnered to date by KU scholars into a single volume gave us pause to reflect on the accomplishments of our predecessors and colleagues, and reaffirmed our conviction in the importance of maintaining Kyoto University as a haven for open-minded intellectual curiosity. Unswayed by transient and superficial trends in education and research, Kyoto University will seek to maintain its authentic spirit of academic freedom and diversity, and strive to meet the needs of our time.

**Hiroshi Matsumoto**

President of Kyoto University

# Introduction

This brochure aims to introduce Kyoto University researchers who have been awarded major international accolades since 1949, the year that Professor Hideki Yukawa received the Nobel Prize, to 2013, providing profiles of the individuals researchers, as well as their award-winning research.

As of December 2013, there are eight Kyoto University-affiliated Nobel laureates: Hideki Yukawa (1949), Sin-itiro Tomonaga (1965), Kenichi Fukui (1981), Susumu Tonegawa (1987), Ryoji Noyori (2001), Toshihide Maskawa (2008), Makoto Kobayashi (2008), and Shinya Yamanaka (2012). Kyoto University is also proud to have fostered two Fields Medalists, four Albert Lasker Award winners, and one Gauss Prize winner. This degree of excellence is unparalleled among Japanese universities, and leads to the question of what has inspired such a high level of creativity. The answer may lie in the fundamental principle of "academic freedom" which has guided the university since its founding.

We have tried to include in this publication as much information as possible about each researcher, as well as to share anecdotes about their research. We hope that this brochure will convey to our readers the freedom, depth, and diversity of Kyoto University's academic environment.

## *The Structure of this Brochure*

This brochure comprises the following eight chapters:

Chapters 7 and 8 introduce recipients of the Order of Culture and the Imperial Prize of the Japan Academy, Japan's highest honors to those who have made distinguished contributions to science, technology, the arts, and culture. Although these are domestic awards conferred on Japanese nationals, they have been included in this brochure in order to ensure that the achievements of Kyoto University researchers in the humanities and social science fields are appropriately represented. Due to the nature of those fields, most research papers by Japanese scholars are published in Japanese, and therefore less likely to be recognized internationally. Kyoto University is renowned as one of Japan's leading universities in the humanities and social science fields, and Chapters 7 and 8 reflect some of these great academic achievements.

## *Please Note*

Each award-winning scholar is introduced on a full page within this brochure. In cases where researchers have received multiple awards, the content focuses on the higher profile award at the discretion of the editors. The brochure also introduces award-winning alumni who have not been employed by Kyoto University.

## *Request to Kyoto University Researchers*

While every effort has been made to provide information about all of Kyoto University's major international award winners to date, it is possible that some information may have been overlooked, as there have not been any previous materials compiling such information produced by Kyoto University.

All reasonable care has been taken to ensure the accuracy of the information contained in this brochure, which covers a broad range of academic fields spanning science and the humanities over a period of almost seven decades. If any information is missing or erroneous, please kindly notify the editors so that subsequent editions may be revised.

# About Kyoto University

Kyoto University was originally founded as Kyoto Imperial University on 18 June 1897. It was the second imperial university to be established in Japan.

## *Mission Statement*

"Kyoto University states its mission to sustain and develop its historical commitment to academic freedom and to pursue harmonious coexistence within human and ecological community on this planet."

For further details, please visit the website below:
www.kyoto-u.ac.jp/en/profile/ideals/basic/index.htm

## *University Profile*

**Students** (as of 1 May 2014)
- Undergraduate students: 13,580
- Master's course students: 4,794
- Professional course students: 721
- Doctoral course students: 3,645

- International students (as of 1 May 2014): 1,779
- Students studying abroad (FY2013): 2,507

**Faculty and Staff** (as of 1 May 2014)
- Faculty members: 2,836
- Non-teaching staff members: 2,657

- International faculty members (as of 1 May 2014): 275
- International researchers hosted annually (FY2013): 851

**Facilities and Environment** (as of 1 April 2014)
- Faculties: 10
- Graduate Schools: 18
- Research Institutes: 14
- Intra-University Networks and Organizations: 6
- Education and Research Centers: 17
- Overseas Offices and Facilities: 50

**Finance**
- FY2013 revenues: JPY 174,807 million
- FY2013 expenses: JPY 169,271 million

**International Accolades** (as of 1 April 2014)
- Nobel Prizes: 8
- Fields Medals: 2
- Gauss Prize: 1
- Lasker Awards: 4
- Japan Prizes: 2
- Kyoto Prizes: 4

For details, please see the document below:
www.kyoto-u.ac.jp/contentarea/ja/issue/ku_eprofile/documents/2013/facts_2013.pdf

Chapter

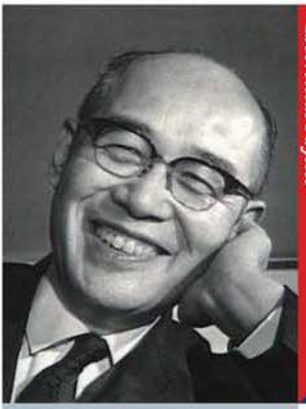
1

# Nobel Prize

*"On 27 November 1895, Alfred Nobel signed his last will and testament, giving the largest share of his fortune to a series of prizes in Physics, Chemistry, Physiology or Medicine, Literature and Peace - the Nobel Prizes." "In this excerpt of the will, Alfred Nobel dictates that his entire remaining estate should be used to endow 'prizes to those who, during the preceding year, shall have conferred the greatest benefit to mankind.'" (Nobel Foundation site: www.nobelprize.org)*

# Nobel Prize in Physics 1949

**Nobel Foundation**



*Theoretical Physics*

**Awarded for**

his prediction of the existence of mesons on the basis of theoretical work on nuclear forces

## Hideki Yukawa [ *1907 - 1981* ]

Doctor of Science

Professor Emeritus, Kyoto University and Osaka University

Hideki Yukawa

## Achievements

Professor Yukawa contributed to the theory of elementary particle physics. From 1934 to 1935, he assumed that the fundamental interactions are carried by particles, and predicted the existence of a certain particle, which was later called "meson," for the strong interaction between protons and neutrons. He also predicted that the mass of a meson is 200 times that of the electron. Moreover he originally attempted to reveal the mechanism of the weak interaction, though this attempt was failed. In 1937, a new particle with the predicted meson mass was discovered. Professor Powell experimentally discovered a meson mediating the nuclear force in 1947, which verified the validity of Yukawa's theory.

## Profile

During his research life, he not only wrote a lot of scientific papers, but also fostered many excellent students. The news of his recipient of Nobel Prize encouraged the Japanese society of those days which had not been fully recovered from the World War II. In his later years, he became a member of Pugwash Conferences on Science and World Affairs, and made efforts to realize the world peace and the abolition of nuclear weapons.

**Timeline**

| | |
|---|---|
| 1929 | Graduated from Kyoto Imperial University Faculty of Science |
| 1936 | Associate Professor, Osaka Imperial University Faculty of Science |
| 1937 | Participated in the Solvay Conferences on Physics |
| 1938 | Received Doctor of Science from Osaka Imperial University |
| 1939 | Professor, Kyoto Imperial University |
| 1948 | Visiting Professor, Institute for Advanced Study, USA |
| 1950 | Professor, Columbia University |
| 1955 | Board of Japanese National Commission for UNESCO |
| 1955 | President, the Physical Society of Japan |
| 1970 | Retired from Kyoto University and entitled Professor Emeritus |
| 2005 | UNESCO made a medal of Yukawa for his memorial |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1940 | Imperial Prize, the Japan Academy, Japan |
| 1943 | Order of Culture, Japan (as the youngest receipt) |
| 1963 | Foreign Member, the Royal Society, UK |
| 1964 | Lomonosov Gold Medal, Russian Academy of Sciences, Russia |
| 1967 | Medal of Merit, Order of the Federal Republic of Germany |
| 1967 | Medal of the Pontifical Academy of Sciences, Italy |
| 1977 | Grand Cordon of the Order of the Rising Sun, Japan |

# Nobel Prize in Physics 1965

**Nobel Foundation**

Photo: Tomonaga Memorial Room, University of Tsukuba

*Theoretical Physics*

**Awarded for**

the fundamental work in quantum electrodynamics, with deep-ploughing consequences for the physics of elementary particles

## Sin-itiro Tomonaga [ *1906 - 1979* ]

Doctor of Science

Professor Emeritus, Tokyo University of Education

Sin-itiro Tomonaga

## Achievements

In 1943, Professor Tomonaga formulated the theory of quantum fields in a relativistically covariant form to establish the "super-many-time theory," completing the quantum field theory. In the 1930s to 1940s, researchers of the quantum mechanics of fields faced a serious problem: Theoretical calculation of the electron mass gave infinity, inconsistent with the measurement. In 1946, Tomonaga solved this problem by the "renormalization theory."

## Profile

Sin-itiro Tomonaga was a classmate of Hideki Yukawa (see p. 9) at Kyoto Imperial University and he stayed on as an assistant for three years at the University, upon completion of his bachelor's degree. In 1965, Tomonaga was awarded the Nobel Prize in Physics for his fundamental work in quantum electrodynamics, which greatly enhanced understanding of the physics of elementary particles.

**Timeline**

| | |
|---|---|
| 1929 | Graduated from Kyoto Imperial University Faculty of Science |
| 1937 | Studied in Leipzig, Germany |
| 1939 | Received Doctor of Science from Tokyo Imperial University |
| 1941 | Professor, Tokyo University of Arts and Science |
| 1951 | Professor, Tokyo University of Education (-1969) |
| 1951 | Visited the Institute of Advanced Study, USA |
| 1955 | Established the Institute of Particle and Nuclear Studies at the University of Tokyo |
| 1956 | President, Tokyo University of Education (-1961) |
| 1963 | President, Science Council of Japan (-1969) |
| 1969 | Retired from Tokyo University of Education and entitled Professor Emeritus |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1948 | Japan Academy Prize, the Japan Academy, Japan |
| 1952 | Order of Culture, Japan |
| 1964 | Lomonosov Gold Medal, Russian Academy of Sciences, Russia |
| 1976 | Grand Cordon of the Order of the Rising Sun, Japan |

# Nobel Prize in Chemistry 1981

**Nobel Foundation**

Chemistry

**Awarded for**
his work concerning the course of chemical reactions

## Kenichi Fukui [ *1918 - 1998* ]

Doctor of Engineering
Professor Emeritus, Kyoto University

Kenichi Fukui

## Achievements

Professor Fukui strived to theoretically elucidate chemical reactions using quantum mechanics. Classical theory of chemical reactions based on electrical attraction between a positively charged atom and a negatively charged atom cannot explain all chemical reactions. Quantum mechanics dictates the existence of orbitals, which represent the energy and distribution of electrons in a molecule. Fukui discovered that some of these orbitals play critical roles in chemical reactions, and then provided a perfect description of the essence of chemical reactions. In 1952, he published this description, which he called the frontier electron theory (later renamed the frontier orbital theory). The frontier orbital theory is useful in understanding and predicting numerous chemical reactions, and remains essential in today's chemistry. In 1981, Fukui was awarded the Nobel Prize in Chemistry for his achievement.

## Profile

Kenichi Fukui was one of the most distinguished chemists in Japan and was a professor at Kyoto University from 1951 to 1982. He believed that the basic science research is very important, that research experience requires originality, and that people should foster a peaceful relationship between science and society. A number of his students have also contributed to the field of chemistry being inspired by his teachings. He always liked jotting down his research ideas.

**Timeline**

| | |
|---|---|
| 1941 | Graduated from Kyoto Imperial University Faculty of Engineering |
| 1945 | Associate Professor, Kyoto Imperial University |
| 1948 | Received Doctor of Engineering from Kyoto University |
| 1951 | Professor, Kyoto University |
| 1971 | Dean, Faculty of Engineering, Kyoto University |
| 1982 | Retired from Kyoto University and entitled Professor Emeritus |
| 1982 | President, Kyoto Institute of Technology |
| 1988 | Professor Emeritus, Kyoto Institute of Technology |
| 1995 | President, Japan Society for the Promotion of Science |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1962 | The Japan Academy Medal, Japan |
| 1981 | Order of Culture, Japan |
| 1988 | Grand Cordon of the Order of the Rising Sun, Japan |
| 1989 | Foreign Member, the Royal Society, UK |

# Nobel Prize in Physiology or Medicine 1987

**Nobel Foundation**

Photo: RIKEN Brain Science Institute

*Molecular Biology, Neuroscience*

**Awarded for**

his discovery of the genetic mechanism for the generation of antibody diversity

## Susumu Tonegawa [ *1939 -* ]

Ph.D. in Molecular Biology
Picower Professor of Biology and Neuroscience, MIT
Director, RIKEN-MIT Center for Neural Circuit Genetics
Director, RIKEN Brain Science Institute
Founding Director, Center for Learning and Memory, MIT
Founding Director, Picower Institute for Learning and Memory, MIT

Susumu Tonegawa

## Achievements

Lymphocytes play a major role in the immune system by expressing over one trillion antibody receptors that recognize pathogens and other foreign substances. Humans have no more than 30,000 genes, and how they generate this vast antibody repertoire was considered one of the greatest mysteries of life science in the 20th century. Tonegawa discovered the genetic mechanism for producing this antibody diversity, called somatic recombination.

## Profile

Susumu Tonegawa received his bachelor's degree from Kyoto University in 1963. After working at the Salk Institute for Molecular Biology of Tumor Viruses and the Basel Institute for Immunology, where he discovered the genetic basis of antibody diversity, he was appointed Professor at the Massachusetts Institute of Technology (MIT) in 1981. He changed his research field from immunology to neuroscience and became the Founding Director of the Center for Learning and Memory in 1994, which evolved into the Picower Institute of Learning and Memory. Since 2009, he serves as Director of the RIKEN Brain Science Institute in Japan while maintaining his positions as Picower Professor and Howard Hughes Investigator at MIT.

**Timeline**

| | |
|---|---|
| 1963 | Graduated from Kyoto University Faculty of Science |
| 1968 | Received Ph.D. from UCSD |
| 1969 | Postdoctoral Researcher, Salk Institute |
| 1971 | Member, Basel Institute for Immunology, Switzerland |
| 1981 | Professor, MIT |
| 1988 | Investigator, Howard Hughes Medical Institute |
| 1994 | Director, Center for Learning and Memory at MIT |
| 2002 | Director, Picower Institute for Learning and Memory at MIT |
| 2009 | Director, RIKEN Brain Science Institute |
| 2013 | Investigator (reappointed), Howard Hughes Medical Institute |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1978 | The Cloetta Prize of Foundation Professor Dr. Max Cloetta, Switzerland |
| 1982 | Louisa Gross Horwitz Prize, Columbia University, USA |
| 1983 | Canada Gairdner International Award, the Gairdner Foundation, Canada |
| 1983 | Person of Cultural Merit, Japan |
| 1984 | Order of Culture, Japan |
| 1984 | Fellow, American Academy of Arts and Sciences, USA |
| 1986 | Robert-Koch Prize, the Koch Foundation, Germany |
| 1986 | Foreign Associate, National Academy of Sciences, USA |
| 1987 | Albert Lasker Basic Medical Research Award, Lasker Foundation, USA |
| 1989 | Distinguished Basic Investigator Award, American College of Rheumatology, USA |
| 1989 | Rabbi Shai Shacknai Memorial Prize in Immunology and Cancer Research, Israel |
| 1991 | Order of the Southern Cross, Brazil |
| 1994 | Professorship, Amgen, Inc., USA |
| 1994 | Honorary member, and awarded the Golden Medal "Medicus Magnus," Polish Academy of Medicine, Poland |
| 1999 | Mike Hogg Award, the University of Texas M.D. Anderson Cancer Center, USA |
| 1999 | Professorship, Whitehead Family Funds |
| 2002 | Professorship, Picower Foundation |
| 2002 | Presidential Lecturer, Society for Neuroscience Annual Meeting, USA |
| 2007 | Gold Medal, Spanish National Research Council, Cajal Institute, Madrid, Spain |
| 2008 | UCL Prize Lecturer in Clinical Science, University College London, UK |
| 2010 | David M. Bonner Lifetime Achievement Award, UCSD, USA |

# Nobel Prize in Chemistry 2001

**Nobel Foundation**


Photo: RIKEN

Organic Chemistry

**Awarded for**

his work on chirally catalyzed hydrogenation reactions

## Ryoji Noyori [ 1938 - ]

Doctor of Engineering
Member of the Japan Academy
President of RIKEN
University Professor, Nagoya University

Ryoji Noyori

## Achievements

Professor Noyori initiated and developed asymmetric catalysis using organometallic molecular catalysts. His methods allow for efficient synthesis of biologically active chiral organic compounds and are now practiced widely in research and industry.

## Profile

Ryoji Noyori received his doctorate degree in engineering from Kyoto University, worked as a postdoctoral fellow at Harvard University, and taught at Nagoya University. Currently, he is a University Professor at Nagoya and President of RIKEN. Noyori has chaired various government committees for science and technology as well as higher education. He is a member of the Japan Academy and the Pontifical Academy of Sciences; a foreign member of the National Academy of Sciences, USA, the Russian Academy of Sciences, the National Academy of Sciences, Korea, the Royal Society, UK, and the Chinese Academy of Sciences; and also an honorary academician of the Academia Sinica, Taiwan.

**Timeline**

| | |
|---|---|
| 1961 | Bachelor degree, Kyoto University |
| 1963 | Master's degree, Kyoto University |
| 1963 | Instructor, Kyoto University |
| 1967 | Doctorate in Engineering, Kyoto University |
| 1968 | Associate Professor, Nagoya University (-1972) |
| 1969 | Postdoctoral Fellow, Harvard University (-1970) |
| 1972 | Professor, Nagoya University |
| 1997 | Dean, Graduate School of Science, Nagoya University (-1999) |
| 2002 | President, Chemical Society of Japan (-2003) |
| 2003 | University Professor, Nagoya University (-present) |
| 2003 | President, RIKEN (-present) |
| 2005 | Chair, Science and Technology Council, Ministry of Education, Culture, Sports, Science and Technology (-present) |
| 2005 | Member, Science Council of Japan (-2007) |
| 2006 | Chair, Education Rebuilding Council (-2008) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1993 | Tetrahedron Prize for Creativity in Organic Chemistry, UK |
| 1995 | Japan Academy Prize, the Japan Academy, Japan |
| 1997 | Arthur C. Cope Award, American Chemical Society, USA |
| 1998 | Person of Cultural Merit, Japan |
| 1999 | King Faisal International Prize for Science, Kingdom of Saudi Arabia |
| 2000 | Order of Culture, Japan |
| 2001 | Wolf Prize in Chemistry, Wolf Foundation, Israel |
| 2001 | Roger Adams Award in Organic Chemistry, American Chemical Society, USA |
| 2010 | Lomonosov Gold Medal, Russian Academy of Sciences, Russia |

# Nobel Prize in Physics 2008

**Nobel Foundation**

Photo: Nagoya University

*Theoretical Physics*

**Awarded for**

the discovery of the origin of the broken symmetry which predicts the existence of at least three families of quarks in nature

## Toshihide Maskawa [ *1940 -* ]

Doctor of Science
Member of the Japan Academy
Professor Emeritus, Kyoto University
Director General, KMI, Nagoya University
Head, Maskawa Institute, Kyoto Sangyo University

Toshihide Maskawa

## Achievements

Professor Maskawa, with Professor Makoto Kobayashi (see p.15), explained broken symmetry between particle and antiparticle known as CP violation within the Standard Model (SM) of elementary particle theory. In 1973, they found a natural explanation of CP violation with at least six quarks within the SM. The 5th and 6th quarks were discovered in 1977 and 1995, respectively. A large CP violation in B meson system, which is deduced from their model, was first observed in 2001. In 2008, Maskawa and Kobayashi were awarded the Nobel Prize in Physics for their contribution to particle physics.

## Profile

Toshihide Maskawa received a Doctor of Science in 1967 from Nagoya University. In the early 1970s, when he was an assistant professor at Kyoto University, he collaborated with Makoto Kobayashi, who were jointly awarded the Nobel Prize in Physics in 2008. From 1997 until 2003, he was the director of the Yukawa Institute for Theoretical Physics, and is a professor emeritus of Kyoto University. He is currently the Director General of KMI, Nagoya University, and is Head of the Maskawa Institute at Kyoto Sangyo University.

**Timeline**

| | |
|---|---|
| 1967 | Received Doctor of Science from Nagoya University |
| 1967 | Assistant Professor, Nagoya University |
| 1970 | Assistant Professor, Kyoto University |
| 1976 | Associate Professor, Institute for Nuclear Study, the University of Tokyo |
| 1980 | Professor, Yukawa Institute for Theoretical Physics, Kyoto University |
| 1990 | Professor, Kyoto University |
| 1997 | Director, Yukawa Institute for Theoretical Physics, Kyoto University |
| 2003 | Retired from Kyoto University and entitled Professor Emeritus |
| 2003 | Professor, Kyoto Sangyo University |
| 2009 | Head, Maskawa Institute, Kyoto Sangyo University |
| 2010 | Director General, Kobayashi-Maskawa Institute for the Origin of Particles and the Universe (KMI) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1985 | Japan Academy Prize, the Japan Academy, Japan |
| 1985 | J. J. Sakurai Prize for Theoretical Particle Physics (inaugural award), American Physical Society, USA |
| 2001 | Person of Cultural Merit, Japan |
| 2007 | High Energy and Particle Physics Prize, European Physical Society |
| 2008 | Order of Culture, Japan |

# Nobel Prize in Physics 2008

**Nobel Foundation**

Photo: KEK

*Theoretical Physics*

**Awarded for**

the discovery of the origin of the broken symmetry which predicts the existence of at least three families of quarks in nature

## Makoto Kobayashi [*1944-*]

Doctor of Science
Member of the Japan Academy
Honorary Professor Emeritus, High Energy Accelerator Research Organization
University Professor, Nagoya University
Fellow, International Institute for Advanced Studies

Makoto Kobayashi

### Achievements

Professor Kobayashi explained the mechanism underlying the breakdown of symmetry between particles and antiparticles together with Professor Toshihide Maskawa (see p.14). In 1973, they wrote an article titled "CP Violation in the Renormalizable Theory of Weak Interaction." In this work, they predicted the possible existence of six kinds of quarks. This had been confirmed experimentally by 1995. In 2008, he and Professor Maskawa were awarded the Nobel Prize in Physics for their contribution to the advancement of particle physics.

### Profile

Makoto Kobayashi received a Doctor of Science in 1972 from Nagoya University. In the early 1970s, when he was an assistant professor at Kyoto University, he collaborated with Professor Toshihide Maskawa on research that resulted in the work for which they were jointly awarded the Nobel Prize in Physics in 2008. Presently, he is an honorary professor emeritus at KEK (High Energy Accelerator Research Organization).

**Timeline**

| | |
|---|---|
| 1972 | Received Doctor of Science from Nagoya University |
| 1972 | Assistant Professor, Kyoto University |
| 1979 | Associate Professor, KEK |
| 1985 | Professor, KEK |
| 2003 | Director, Institute of Particles and Nuclear Studies at KEK |
| 2004 | Trustee, KEK |
| 2006 | Retired from KEK and entitled Professor Emeritus |
| 2006 | Fellow, International Institute for Advanced Studies |
| 2007 | Executive Director, the Japan Society for the Promotion of Science |
| 2007 | Chair of Advisory Board, Kobayashi-Maskawa Institute for the Origin of Particles and the Universe |
| 2008 | Honorary Professor Emeritus, KEK |
| 2009 | University Professor, Nagoya University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1985 | Japan Academy Prize, the Japan Academy, Japan |
| 1985 | J. J. Sakurai Prize for Theoretical Particle Physics (inaugural award), American Physical Society, USA |
| 2001 | Person of Cultural Merit, Japan |
| 2007 | High Energy and Particle Physics Prize, European Physical Society |
| 2008 | Order of Culture, Japan |

# Nobel Prize in Physiology or Medicine 2012

**Nobel Foundation**

Medical Physiology

**Awarded for**

the discovery that mature cells can be reprogrammed to become pluripotent

## Shinya Yamanaka [ 1962 - ]

M.D. and Ph.D. in Medicinal Science
Member of the Japan Academy
Director and Professor,
The Center for iPS Cell Research and Application (CiRA), Kyoto University
Senior Investigator, Gladstone Institutes,
University of California in San Francisco (UCSF)

Shinya Yamanaka

## Achievements

Professor Yamanaka and his research team reported the world's first generation of mouse iPS cells (induced pluripotent stem cells) in 2006 and the generation of human iPS cells in 2007. The team also reported the establishment of mouse iPS cells using plasmid DNA vectors in 2008, one of the first methods to generate such cells without requiring gene insertion. Yamanaka was awarded the prize jointly with Sir John B. Gurdon, a Fellow of the Royal Society and professor at and founder of the Wellcome Trust/Cancer Research UK Gurdon Institute, the University of Cambridge.

## Profile

Shinya Yamanaka at first pursued a career as an orthopedic surgeon and later began conducting stem cell research for medical applications. He moved to Kyoto University in 2004, and since 2008 has served as the director of the University's Center for iPS Cell Research and Application (CiRA).

**Timeline**

| | |
|---|---|
| 1987 | Graduated from Kobe University School of Medicine, M.D. |
| 1987 | Resident, National Osaka Hospital (-1989) |
| 1989 | Studied Phamacology at Osaka City University Graduate School (-1993) |
| 1993 | Received Ph.D. in Medicine at Osaka City University |
| 1993 | Postdoc, Gladstone Institutes, University of California in San Francisco (UCSF) (-1996) |
| 1996 | Assistant Professor, Osaka City University (-1999) |
| 1999 | Associate Professor, Nara Institute of Science and Technology (NAIST) (-2003) |
| 2003 | Professor, NAIST (-2005) |
| 2004 | Professor, Institute for Frontier Medical Sciences, Kyoto University (-2007) |
| 2007 | Senior Investigator, Gladstone Institutes, UCSF |
| 2007 | Professor, UCSF |
| 2007 | Professor, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University (-2012) |
| 2008 | Director, Center for iPS Cell Research and Application (CiRA) at WPI-iCeMS, Kyoto University (-2010) |
| 2010 | Director, CiRA, Kyoto University |
| 2012 | President, International Society for Stem Cell Research (-2013) |
| 2012 | Professor, CiRA, Kyoto University |
| 2012 | Principal Investigator, iCeMS, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2008 | Robert Koch Award, The Robert Koch Foundation, Germany |
| 2008 | The Shaw Prize in Life Science and Medicine |
| 2008 | Medal with Purple Ribbon, Japan |
| 2009 | Canada Gairdner International Award, The Gairdner Foundation, Canada |
| 2009 | Albert Lasker Basic Medical Research Award, Lasker Foundation, USA |
| 2010 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 2010 | International Balzan Prize, the International Balzan Prize Foundation |
| 2010 | Kyoto Prize, Inamori Foundation, Japan |
| 2011 | Wolf Prize in Medicine, Wolf Foundation, Israel |
| 2011 | King Faisal International Prize in Medicine, King Faisal Foundation, Kingdom of Saudi Arabia |
| 2011 | Foreign Associate, National Academy of Science, USA |
| 2012 | Millennium Technology Prize, Technology Academy Finland, Finland |
| 2012 | Order of Culture, Japan |
| 2013 | Breakthrough Prize in Life Sciences, the Breakthrough Prize in Life Sciences Foundation |

# AWARD HISTORY 1949-1977

## 1949
**Hideki Yukawa**
*Nobel Prize in Physics*

## 1950
**Hajime Tanabe**
*Order of Culture, Japan*
**Shoichi Sakata**
*Imperial Prize*

## 1952
**Soichiro Sasaki**
*Order of Culture, Japan*
**Seiichi Mizuno**
*Imperial Prize*
**Toshio Nagahiro**
*Imperial Prize*

## 1953
**Toru Haneda**
*Order of Culture, Japan*

## 1954
**Jitsuzo Tamura**
*Imperial Prize and Japan Academy Prize*
**Yukio Kobayashi**
*Imperial Prize and Japan Academy Prize*

## 1956
**Izuru Shinmura**
*Order of Culture, Japan*
**Masuzo Shikata**
*Imperial Prize and Japan Academy Prize*
**Isamu Tachi**
*Imperial Prize and Japan Academy Prize*

## 1961
**Torao Suzuki**
*Order of Culture, Japan*

## 1962
**Yoshinari Kuwada**
*Order of Culture, Japan*

## 1965
**Sin-itiro Tomonaga**
*Nobel Prize in Physics*
**Shin-ichi Matsumoto**
*Schaudinn-Hoffman-Plakette*

## 1967
**Makoto Kumada**
*Frederic Stanley Kipping Award in Silicon Chemistry*

## 1968
**Tatsuo Nishida**
*Imperial Prize and Japan Academy Prize*

## 1970
**Heisuke Hironaka**
*Fields Medal*
**Seizo Okamura**
*Imperial Prize and Japan Academy Prize*

## 1977
**Ichiro Sakurada**
*Order of Culture, Japan*

# Chapter 2

## Carl Friedrich Gauss Prize

*"The prize is to honor scientists whose mathematical research has had an impact outside mathematics – either in technology, in business, or simply in people's everyday lives." (International Mathematical Union site: www.mathunion.org)*

## Wolf Prize

*"Since 1978, five or six prizes have been awarded annually in the Sciences. Prize fields comprise: AGRICULTURE, CHEMISTRY, MATHEMATICS, MEDICINE and PHYSICS. In the Arts, the prize rotates annually among ARCHITECTURE, MUSIC, PAINTING and SCULPTURE." (Wolf Foundation site: www.wolffund.org.il)*

## Fields Medal

*"The Fields Medal is awarded every four years on the occasion of the International Congress of Mathematicians to recognize outstanding mathematical achievement for existing work and for the promise of future achievement." (International Mathematical Union site: www.mathunion.org)*

## Albert Lasker Basic Medical Research Award

*"The Albert Lasker Basic Medical Research Award honors scientists whose fundamental investigations have provided techniques, information, or concepts contributing to the elimination of major causes of disability and death." (The Lasker Foundation site: www.laskerfoundation.org)*

# Carl Friedrich Gauss Prize 2006

***International Mathematical Union***

*Mathematics*

**Awarded for**

stochastic Analysis, a field of mathematics based primarily on his groundbreaking work, which has found significant applications outside of mathematics, and contributed to the development of diverse human scientific activities.

## Kiyosi Itô [ *1915 - 2008* ]

Doctor of Science
Professor Emeritus, Kyoto University
Doctor of Science, Tokyo Imperial University
Docteur Honoris Causa, Université Paris VI
Doctor Honoris Mathematica, ETH, Zürich
Doctor of Science Honoris Causa, University of Warwick

Kiyosi Itô

## Achievements

Professor Itô made outstanding contributions to probability theory. His epoch-making theory of stochastic differential equation, first published in 1942, described non-deterministic random evolutions. Known as *Ito Calculus*, it replaced the Newton-Leibniz calculus for random processes and has found applications in other fields of mathematics as well as in other disciplines, including various fields in physics, control theory in engineering, population genetics in biology and, most recently, mathematical finance in economics.

## Profile

Kiyosi Itô was born in Mie, Japan. Besides being renowned for his brilliant mathematical achievements during a productive career spanning over sixty years, he has been a truly inspirational teacher to many mathematicians in Japan and abroad. He has received numerous national and international awards and honors.

**Timeline**

| | |
|---|---|
| 1938 | Graduated from Tokyo Imperial University Faculty of Science |
| 1939 | Statistical Officer, Statistics Bureau of the Cabinet Secretariat, Japan |
| 1943 | Assistant Professor, Nagoya Imperial University |
| 1945 | Doctor of Science, Tokyo Imperial University |
| 1952 | Professor, Kyoto University |
| 1954 | Fulbright Fellow, Institute for Advanced Study, Princeton |
| 1961 | Professor, Stanford University |
| 1966 | Professor, Aarhus University |
| 1969 | Professor, Cornell University |
| 1976 | Director, Research Institute for Mathematical Sciences, Kyoto University |
| 1979 | Retired from Kyoto University and entitled Professor Emeritus |
| 1979 | Professor, Gakushuin University |
| 1985 | Retired from Gakushuin University |
| 1989 | Membre Associé Étranger, Académie des Sciences, France |
| 1991 | Member, the Japan Academy |
| 1995 | Honorary Member, Moscow Mathematical Society |
| 1998 | Foreign Member, National Academy of Sciences, USA |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1978 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 1987 | Wolf Prize in Mathematics, Wolf Foundation, Israel |
| 1998 | Kyoto Prize, Inamori Foundation, Japan |
| 2003 | Person of Cultural Merit, Japan |
| 2008 | Order of Culture, Japan |

# Wolf Prize in Medicine 1986

**Wolf Foundation**

Photograph: Naruko Ogata
Reference: "Biohistory" Museum Library

Biochemistry

**Awarded for**

his discovery of the oxygenase enzymes and elucidation of their structure and biological importance.

## Osamu Hayaishi [ *1920 -* ]

M.D. and Ph.D in Medicine
Member of the Japan Academy
Professor Emeritus, Kyoto University
Chief Director, Osaka Bioscience Institute

Osamu Hayaishi

## Achievements

Professor Hayaishi significantly contributed to research in the biomedical sciences and enzymology by discovering oxygenases, respiratory enzymes that are broadly spread in nature. Before his discovery, dehydrogenation was considered to be the only mechanism of biological oxidation. In showing the biological fixation of molecular oxygen, he introduced a new concept for the mechanism of biological oxidation.

## Profile

Osamu Hayaishi is one of the pioneers in the medical chemistry field. After his discovery of oxygenases in the USA, he was appointed at Kyoto University, where he extended his study to include the metabolic pathways of oxygenases. He was selected as among the Persons of Cultural Merit in Japan in 1972. He was decorated with the Order of Culture and the Grand Cordon of the Order of the Sacred Treasure in Japan in 1972 and 1993, respectively.

**Timeline**

| | |
|---|---|
| 1946 | Assistant Professor, Osaka University |
| 1949 | Received Doctor of Medicine from Osaka University |
| 1949 | Research Fellow, the University of Wisconsin |
| 1950 | Research Fellow, the University of California |
| 1951 | Research Fellow, National Institute of Health, USA |
| 1952 | Professor, Department of Medicine, the University of Washington |
| 1954 | Dean, Department of Toxicology, National Institute of Health, USA |
| 1958 | Professor, Faculty of Medicine, Kyoto University |
| 1961 | Professor, Faculty of Medicine, Osaka University (-1963) |
| 1968 | Professor, Vanderbilt University |
| 1970 | Professor, Faculty of Medicine, the University of Tokyo (-1974) |
| 1979 | Dean, Faculty of Medicine, Kyoto University |
| 1983 | Retired from Kyoto University and became Professor Emeritus |
| 1987 | Director, Osaka Bioscience Institute |
| 1998 | Honorary Director, Osaka Bioscience Institute |
| 2004 | Chief Director, Osaka Bioscience Institute |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1967 | Japan Academy Prize, the Japan Academy, Japan |
| 1972 | Person of Cultural Merit, Japan |
| 1972 | Order of Culture, Japan |
| 1972 | Foreign Associate, National Academy of Science, USA |
| 1974 | Member, the Japan Academy |
| 1975 | Vermeil Medal of the City of Paris, France |
| 1976 | New York Academy Biochemistry Award, The New York Academy of Sciences, USA |
| 1993 | Grand Cordon of the Order of the Sacred Treasure, Japan |

# Wolf Prize in Mathematics 2002/2003

**Wolf Foundation**

Mathematics

**Awarded for**

the creation of "algebraic analysis", including hyperfunction and microfunction theory, holonomic quantum field theory, and a unified theory of soliton equations

## Mikio Sato [ 1928 - ]

Doctor of Science
Professor Emeritus, Kyoto University

Photo: not available

Mikio Sato

## Achievements

Professor Sato created many new main streams in mathematics with his original, profound, and brilliant ideas. In the earlier stage of his research, he introduced the theory of hyperfunctions by extending the usual notion of functions via relative cohomology groups with coefficients in a sheaf. He likewise established the foundation of microlocal analysis and correspondences between solutions for soliton equations and infinite dimensional Grassmannian manifolds. The latter result led to the discovery of his famous tau function.

## Profile

Mikio Sato has been a leading scholar in mathematics and has fostered many brilliant students. These students, who are known as "Sato School," play important roles in the mathematical community. Although he has not written many research papers, he has freely shared his numerous ideas gushing like a spring with his students, which have developed and deepened much further. Indeed, his lecture notes and interviews reveal his original insights.

**Timeline**

| | |
|---|---|
| 1952 | Graduated from the University of Tokyo |
| 1963 | Received Doctor of Science from the University of Tokyo |
| 1970 | Professor, Research Institute for Mathematical Sciences, Kyoto University |
| 1987 | Director, Research Institute for Mathematical Sciences, Kyoto University |
| 1992 | Retired from Kyoto University and entitled Professor Emeritus |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1976 | Japan Academy Prize, the Japan Academy, Japan |
| 1984 | Person of Cultural Merit, Japan |
| 1997 | Rolf Schock Prize, Sweden |

# Fields Medal 1970

## International Mathematical Union

Photo: Yamaguchi University

Mathematics

**Awarded for**

the resolution of singularities of algebraic varieties over a field of characteristic zero

## Heisuke Hironaka [1931 - ]

Ph.D. in Science and Doctor of Science
Member of the Japan Academy
Professor Emeritus, Kyoto University and Harvard University

Heisuke Hironaka

### Achievements

The most remarkable achievement of Professor Hironaka is his breakthrough in proving the existence of a resolution of singularities for algebraic varieties in a field of characteristic zero. This problem was one of the most fundamental ones in algebraic geometry. Before his achievement, many mathematicians approached this problem, and several results were produced in relation to one-, two-, and three-dimensional algebraic varieties. He proved the above for arbitrary dimensions. He developed various original algebraic techniques for his proof, and these are also applied to a wide range of other problems in mathematics.

### Profile

Heisuke Hironaka was greatly influenced by Alexander Grothendieck, a professor in his times at Institut des Hautes Études Scientifiques (IHÉS) who laid the foundations of modern algebraic geometry. Professor Hironaka established the Heisuke Hironaka Fund in 2002 to promote connections between IHÉS and Japanese mathematicians. He has also continuously encouraged young people who are interested in mathematics; the Japan Association for Mathematical Sciences, founded by Professor Hironaka, provides fellowships for Japanese students aiming to pursue doctoral studies overseas.

**Timeline**

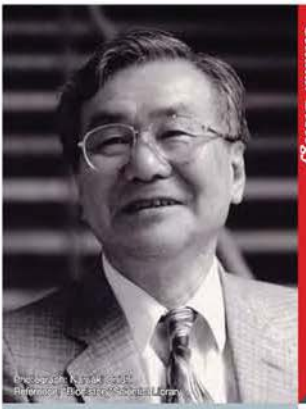
| | |
|---|---|
| 1956 | Received Master's degree from Kyoto University |
| 1960 | Received Ph.D. at Harvard University |
| 1960 | Lecturer, Brandeis University |
| 1963 | Associate Professor, Brandeis University |
| 1963 | Received Doctor of Science from Kyoto University |
| 1964 | Professor, Columbia University |
| 1968 | Professor, Harvard University |
| 1975 | Professor, Research Institute for Mathematical Sciences, Kyoto University |
| 1984 | President, Japan Association for Mathematical Sciences |
| 1992 | William Elwood Byerly Professor Emeritus, Harvard University |
| 1996 | President, Yamaguchi University (-2002) |
| 2008 | Visiting Professor, Seoul National University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1975 | Order of Culture, Japan |
| 2004 | L'ordre national de la Légion d'honneur, France |

# Albert Lasker Basic Medical Research Award 1998

**Lasker Foundation**



Cellular Biology

## Awarded for

(to Lee Hartwell, Paul Nurse, and Yoshio Masui) their pioneering genetic and molecular studies that revealed the universal machinery for regulating cell division in all eukaryotic organisms, from yeasts to frogs to human beings*

## Yoshio Masui [ *1931 -* ]

Doctor of Science

Professor Emeritus, University of Toronto

Yoshio Masui

## Achievements

Professor Masui discovered a protein, called the maturation promoting factor (MPF), in the cytoplasm of cells that control cell division in fertilized frog eggs. His discovery with Drs. Lee Hartwell and Paul Nurse, who were jointly awarded as well, greatly contributed to modern understanding of the universal mechanism for regulating cell division in all eukaryotic organisms.

## Profile

Yoshio Masui studied biology at Kyoto University and received his Doctor of Science degree in 1961. Beginning in 1955, he taught biology at Konan University. In 1966, he took a sabbatical from his position as assistant professor and attended Clement Markert's laboratory at Yale University, where he began his work on frog oocytes. Three years later, he moved to the University of Toronto as an associate professor, and in the same year, he discovered that MPF is a protein. In 1978, he became a professor at the University of Toronto. He received the Gairdner Foundation International Award in 1992.

**Timeline**

| | |
|---|---|
| 1955 | Received Master's degree from Kyoto University |
| 1955 | Taught as Assistant Professor at Konan University |
| 1961 | Received Doctor of Science from Kyoto University |
| 1965 | Associate Professor, Konan University |
| 1969 | Associate Professor, University of Toronto |
| 1978 | Professor, University of Toronto |
| 1997 | Professor Emeritus at University of Toronto |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1992 | Gairdner Foundation International Award, the Gairdner Foundation, Canada |

* *Authority: Lasker Foundation (http://www.laskerfoundation.org/awards/1998_b_description_p.htm)*

# Albert Lasker Basic Medical Research Award 1989

**Lasker Foundation**


Photo: Kobe University

Biochemistry

**Awarded for**

his profound contributions to the understanding of signal transduction in cells, and for his discovery that carcinogens trigger cell growth by activating protein kinase C

## Yasutomi Nishizuka [ *1932 - 2004* ]

M.D. and Ph.D. in Medicine
Professor Emeritus, Kobe University

Yasutomi Nishizuka

## Achievements

Professor Nishizuka discovered protein kinase C (PKC) from bovine brain and elucidated its regulating mechanism by $Ca^{2+}$ and phorbol ester. Using techniques in molecular biology, his team and succeeding teams reported 11 isotypes of PKCs, which form a group of proteins called "PKC family." Further biochemical and molecular biological studies constructed the field of PKC as a part of biology, and currently, PKC family proteins are known to regulate fundamental cellular and tissue functions.

## Profile

Yasutomi Nishizuka was trained at Kyoto University as a biochemist under the supervision of Professor Osamu Hayaishi (see p. 20). In addition to his highly recognized work on PKCs at Kobe University, Professor Nishizuka also contributed to the field of biochemistry through training many talented young scientists. In 1995, he was appointed President of Kobe University amid the chaos brought by the Hanshin-Awaji Earthquake that affected the university as well. He is revered for being a leader of the University during its recovery from the tragedy.

**Timeline**

| | |
|---|---|
| 1963 | Received Ph.D. in Medicine from Kyoto University |
| 1964 | Associate Professor, Kyoto University Faculty of Medicine |
| 1969 | Professor and Chairperson of the Department of Biochemistry, Kobe University Faculty of Medicine |
| 1989 | Professor, Kobe University Faculty of Science (-1995) |
| 1990 | Visiting Professor, Stanford University School of Medicine (-1995) |
| 1994 | Professor, Institute for Virus Research, Kyoto University (-1995) |
| 1995 | President, Kobe University |
| 2001 | Retired from Kobe University and entitled Professor Emeritus |
| 2001 | President, Hyogo Medical Center for Adults |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1986 | Japan Academy Prize, the Japan Academy, Japan |
| 1987 | Person of Cultural Merit, Japan |
| 1988 | Canada Gairdner International Award, the Gairdner Foundation, Canada |
| 1988 | Alfred P. Sloan Jr. Prize, the General Motors Cancer Research Foundation, USA |
| 1992 | Kyoto Prize, Inamori Foundation, Japan |
| 1992 | Physiology Award from the Netherlands |
| 1994 | Dale Medal, Society for Endocrinology, UK |
| 1995 | Wolf Prize in Medicine, Wolf Foundation, Israel |
| 1995 | Ernst Schering Prize, Ernst Schering Research Foundation, Germany |
| 1996 | Banerjee Medal, the Asiatic Society, India |

# Fields Medal 1990

## International Mathematical Union

Mathematics

**Awarded for**

his remarkable contribution to classification theory in algebraic geometry

## Shigefumi Mori [ 1951 - ]

Doctor of Science
Member of the Japan Academy
Professor, Kyoto University
University Professor, Nagoya University

Shigefumi Mori

### Achievements

Professor Mori pursued his research on algebraic varieties especially of higher dimensions, and his first eminent work was the affirmative answer to the Hartshorne Conjecture in 1978. He started working on the Minimal Model Program, which is often called the Mori Program, and completed its three dimensional case in 1988. He received the Fields Medal in 1990 for these remarkable achievements.

### Profile

Shigefumi Mori became an Assistant Professor at Kyoto University in 1975, an Assistant Professor at Harvard University (1977-80), and a Lecturer at Nagoya University in 1980. Since then he spent much time in the United States at the Institute for Advanced Study (1981-82), Columbia University (1985-87), and University of Utah (1991-93) as a Visiting Member/Professor. He was elected as Member of the Japan Academy in 1998.

**Timeline**

| | |
|---|---|
| 1973 | Graduated from Kyoto University Faculty of Science |
| 1975 | Assistant Professor, Kyoto University |
| 1978 | Received Doctor of Science from Kyoto University |
| 1982 | Associate Professor, Nagoya University |
| 1988 | Professor, Nagoya University |
| 1990 | Professor, Research Institute for Mathematical Sciences, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1990 | Frank Nelson Cole Prize in Algebra, American Mathematical Society, USA |
| 1990 | Japan Academy Prize (jointly with Dr. Shigeru Iitaka and Dr. Yujiro Kawamata), the Japan Academy, Japan |
| 1990 | Person of Cultural Merit, Japan |
| 2010 | University Professor, Nagoya University |

# Chapter 3

## Kyoto Prize

*"The Prize is presented annually in each of the following three categories: Advanced Technology, Basic Sciences, and Arts and Philosophy." " Selection is made without regard to nationality, race, sex, age, or religion." (Inamori Foundation site: www.inamori-f.or.jp/index_e.html)*

## Japan Prize

*"The Japan Prize is awarded annually to scientists and engineers from around the world who have made significant contributions to the advancement of science and technology, thereby furthering the cause of peace and prosperity of mankind. Each year two fields of scientific endeavor are honored." (The Japan Prize Foundation site: www.japanprize.jp/en/)*

## Honda Prize

*"The Honda Prize is an inter-national award that acknowledges the efforts of an individual or group who contribute new ideas which may lead the next generation in the field of ecotechnology. The Honda Foundation has given one award every year for a variety of research results." (Honda Foundation site: www.hondafoundation.jp/en/)*

# Kyoto Prize, Basic Sciences 1995

**Inamori Foundation**

Astrophysics

**Awarded for**

his contribution to astrophysics through the theoretical studies of the stellar formation and evolution and the formation system

## Chushiro Hayashi [ 1920 - 2010 ]

Doctor of Science
Professor Emeritus, Kyoto University

Chushiro Hayashi

## Achievements

Professor Hayashi contributed to the maturation of modern astrophysics, applying scientific principles such as nuclear physics and fluid dynamics to the analysis of astronomical phenomena. He successfully calculated the relationship between star luminosity and temperature, called "Hayashi track," which explains the process of star evolution for the pre-main-sequence.

## Profile

Chushiro Hayashi was born in Kyoto, Japan. He graduated from Tokyo Imperial University in 1942. In 1945, he joined the Yukawa Laboratory at Kyoto Imperial University and stayed there until he retired in 1984. While he continued research as a professor at Kyoto University for 27 years, he also educated many influential astrophysicists.

**Timeline**

| | |
|---|---|
| 1945 | Entered the laboratory of Hideki Yukawa at Kyoto Imperial University |
| 1954 | Received Doctor of Science from Kyoto University |
| 1954 | Associate Professor, Kyoto University |
| 1957 | Professor, Kyoto University |
| 1977 | Dean, Faculty of Science, Kyoto University |
| 1984 | Professor Emeritus, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1970 | Eddington Medal, Royal Astronomical Society, UK |
| 1971 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 1982 | Person of Cultural Merit, Japan |
| 1986 | Order of Culture, Japan |
| 2004 | The Catherine Wolfe Bruce Gold Medal, Astronomical Society of the Pacific, USA |

# Kyoto Prize, Basic Sciences 2013

**Inamori Foundation**

Evolutionary Biology

**Awarded for**

his outstanding research on the evolution of biological populations using quantitative analyses of genetic variation and evolutionary time

## Masatoshi Nei [ 1931 - ]

Doctor of Agriculture and Science
Professor, Pennsylvania State University

Masatoshi Nei

## Achievements

Professor Nei facilitated the research on evolutionary divergence, genetic diversity, and the mode of gene selection in a quantitative manner by devising various statistical methods, such as Nei's genetic distance and neighbor-joining method of phylogenetic construction. Using these methods, he has made important contributions to molecular evolutionary biology as well as many other scientific disciplines, including ecology and conservation biology.

## Profile

Masatoshi Nei is an evolutionary biologist who teaches at Pennsylvania State University. His innovative proposal of genetic distance, which quantifies genetic divergence between species or between populations within a species, has been recognized internationally as Nei's genetic distance. He received his Doctor of Agriculture degree from Kyoto University in 1959. He also served as an assistant professor of the University's Faculty of Agriculture from 1958 to 1962. He has been a member of the American Academy of Arts and Sciences and National Academy of Sciences since 1990 and 1997, respectively.

**Timeline**

| | |
|---|---|
| 1959 | Received Doctor of Agriculture from Kyoto University |
| 1958 | Assistant Professor, Kyoto University |
| 1962 | Researcher, National Institute of Radiological Sciences, Japan |
| 1965 | Head, Population Genetics Laboratory, National Institute of Radiological Sciences, Japan |
| 1969 | Associate Professor, Brown University |
| 1971 | Professor, Brown University |
| 1972 | Professor, University of Texas at Houston |
| 1977 | Received Doctor of Science from Kyushu University |
| 1990 | Director, Institute of Molecular Evolutionary Genetics, Pennsylvania State University |
| 1990 | Professor, Pennsylvania State University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1990 | Fellow, American Academy of Arts and Sciences, USA |
| 1997 | Member, National Academy of Sciences, USA |
| 2002 | International Prize for Biology, Japan Society for the Promotion of Science, Japan |
| 2006 | Thomas Hunt Morgan Medal, Genetics Society of America, USA |

# Japan Prize 2000

## The Japan Prize Foundation

Photograph: Naruaki Onishi
Reference: "Biohistory"Scientist Library

Immunology

**Awarded for**

his discovery of Immunoglobulin E (IgE) and mechanisms of IgE-mediated allergic reactions

# Kimishige Ishizaka [ *1925 -* ]

M.D. and Ph.D. in Medicine
Member of the Japan Academy
President Emeritus, La Jolla Institute for Allergy and Immunology

Kimishige Ishizaka

## Achievements

Professor Ishizaka discovered immunoglobulin E (IgE) as the cause for allergic reactions, contributing to the current understanding of the pathogenesis of allergy at the molecular level. His innovative method for identifying IgE, which is typically the least abundant isotype of immunoglobulin, also contributed greatly to the identification of other less abundant proteins. Further, he discovered that an antigen-antibody complex formed by a bridge between two antibody molecules exerts a physiological activity, thereby contributing to the understanding of cellular and molecular biological processes in allergy progression.

## Profile

In the course of his work in several laboratories in the USA, such as those at the California Institute of Technology, University of Colorado, and Johns Hopkins University School of Medicine, Kimishige Ishizaka attained considerable achievements in the field of allergy and immunology. He achieved much of his scientific accomplishments together with his wife, Teruko Ishizaka, who was also an immunologist. Professor Ishizaka received the First Order of Merit and the Order of the Sacred Treasure in Japan in 1999.

**Timeline**

| | |
|---|---|
| 1948 | Received Ph.D. in Medicine from the University of Tokyo |
| 1953 | Chief, Department of Serology, Division of Immunoserology, National Institute of Health, Japan (-1959) |
| 1957 | Research Fellow, California Institute of Technology (-1959) |
| 1962 | Assistant Professor, Medical School, University of Colorado (-1965) |
| 1962 | Chief, Department of Immunology, Children's Asthma Research Institute and Hospital (-1970) |
| 1970 | O'Neill Professor of Medicine and Microbiology, School of Medicine, The Johns Hopkins University (-1981) |
| 1970 | Professor, The Johns Hopkins University Faculty of Arts and Science (-1989) |
| 1974 | Professor, Kyoto University |
| 1981 | Director, Sub-department of Immunology, The Johns Hopkins University School of Medicine |
| 1989 | President, La Jolla Institute for Allergy and Immunology, and Adjunct Professor, Department of Medicine, University of California, San Diego (UCSD) (-1996) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1972 | Passano Laureate, The Passano Foundation, Inc., USA |
| 1973 | Paul Ehrlich and Ludwig Darmstaedter Prize, Goethe University Frankfurt, Germany |
| 1973 | Canada Gairdner International Award, the Gairdner Foundation, Canada |
| 1974 | The First Scientific Achievement Award of International Association of Allergology, USA |
| 1974 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 1974 | Order of Culture, Japan |
| 1974 | Person of Cultural Merit, Japan |
| 1976 | Distinguished Scientist Award, American Academy of Allergy Asthma & Immunology, USA |
| 1977 | Award for Distinguished Achievement, Modern Medicine, USA |
| 1979 | Borden Award, Association of American Medical Colleges, USA |
| 1982 | Pioneer of Modern Allergy Award, American College of Allergy, USA |
| 1983 | Foreign Associate, National Academy of Sciences, USA |
| 1985 | American College of Physicians Award, American College of Physicians, USA |
| 1999 | Grand Cordon of the Order of the Sacred Treasure, Japan |

Computer Science

**Awarded for**
his pioneering contributions to natural language processing and intelligent image processing

# Makoto Nagao [1936-]

Doctor of Engineering
Professor Emeritus, Kyoto University
The 23rd President of Kyoto University

Makoto Nagao

## Achievements

Professor Nagao developed a practical machine translation system, which followed his proposed new machine translation principle called example-based machine translation. His innovative system generated a significant impact on machine translation research in numerous countries. He also introduced feedback analysis into image processing in face recognition, and his contribution had a considerable influence over subsequent research efforts. Meanwhile, by comprehensively using technologies in natural language and image processing, he proposed a concept of the digital library that would store both text materials and image and sound information. His system, which has been put into practical use, has contributed significantly to the promotion of the digital library.

## Profile

In 1966, Makoto Nagao received his Doctor of Engineering degree from Kyoto University, where he served as an associate professor two years later. Following his appointment as a visiting professor at Grenoble University in 1969-70, he returned to Kyoto University as a professor in 1973. He established the International Association for Machine Translation in 1991 and the Association for National Language Processing in Japan in 1994. In recognition of his outstanding merits, he was elected as the 23rd president of Kyoto University, serving from 1997 to 2003.

**Timeline**

| | |
|---|---|
| 1961 | Assistant Professor, Kyoto University |
| 1966 | Received Doctor of Engineering from Kyoto University |
| 1968 | Associate Professor, Faculty of Engineering, Kyoto University |
| 1973 | Professor, Kyoto University |
| 1986 | Director, Data Processing Center, Kyoto University (-1990) |
| 1997 | Dean, Faculty of Engineering, Kyoto University |
| 1997 | President, Kyoto University (-2003) |
| 2004 | President, National Institute of Information and Communications Technology |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1993 | IEEE Emanuel R. Piore Award, IEEE (Institute of Electrical and Electronics Engineers), USA |
| 1997 | IAMT Award of Honor, International Association for Machine Translation, USA |
| 1997 | Medal with Purple Ribbon, Japan |
| 1999 | Honorary Degree of Doctor of Science, the University of Nottingham, UK |
| 1999 | C&C Prize, NEC C&C Foundation, Japan |
| 2003 | Lifetime Achievement Award, Association for Computational Linguistics, USA |

# Japan Prize 2005

**The Japan Prize Foundation**

Cell and Developmental Biology

**Awarded for**

the fundamental contribution in elucidating the molecular mechanisms of cell-cell adhesion

## Masatoshi Takeichi [ 1943 - ]

Doctor of Science
Member of the Japan Academy
Professor Emeritus, Kyoto University
Director, RIKEN Center for Developmental Biology

Masatoshi Takeichi

## Achievements

Professor Takeichi identified the first members of the cadherin family of calcium-dependent cell-cell adhesion molecules in the late 1970s to early 1980s, a breakthrough that allowed scientists to investigate thoroughly the mechanisms by which complex multicellular structures form and are held together.

## Profile

Masatoshi Takeichi graduated and received his Master's degree in Biology from Nagoya University. While completing his doctoral study, he moved to Tokindo Okada's laboratory (see p.54) at Kyoto University with his supervisor Goro Eguchi. Through his work, he found that calcium is crucial for cell-cell adhesion. Several years later, after his research experience at the Department of Embryology at Carnegie Institution for Science, he finally identified calcium-dependent cell-cell adhesion molecules.

**Timeline**

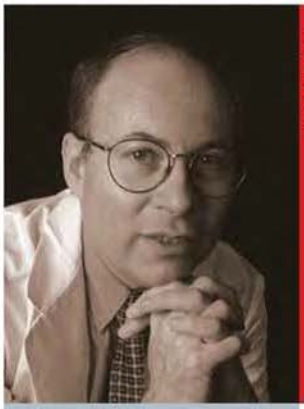
| | |
|---|---|
| 1970 | Assistant Professor, Kyoto University |
| 1973 | Received Doctor of Science from Kyoto University |
| 1978 | Associate Professor, Kyoto University |
| 1986 | Professor, Faculty of Science, Kyoto University (-1999) |
| 1992 | Visiting Professor, National Institute for Basic Biology, Japan (-1998) |
| 1993 | Head, Center for Molecular and Developmental Biology, Kyoto University (-1999) |
| 1999 | Professor, Graduate School of Biostudies, Kyoto University |
| 2002 | Retired from Kyoto University |
| 2002 | Visiting Professor, Kyoto University (-2002) |
| 2002 | Director, RIKEN Center for Developmental Biology |
| 2007 | Professor Emeritus, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1995 | The Princess Takamatsu Cancer Research Fund Prizes, the Princess Takamatsu Cancer Research Fund, Japan |
| 1996 | Japan Academy Prize, the Japan Academy, Japan |
| 2001 | Ross Harrison Prize, International Society of Developmental Biologists |
| 2001 | Keio Medical Science Prize, Keio University Medical Science Fund, Japan |
| 2004 | Person of Cultural Merit, Japan |
| 2007 | Foreign Associate, National Academy of Sciences, USA |
| 2012 | Honorary Doctorate, Ghent University, Belgium |
| 2012 | Thomson Reuters Citation Laureate, Thomson Reuters |

# Honda Prize 2012

**The Honda Foundation**



Neuroscience

## Awarded for

his pioneering efforts in the development of water diffusion measurement by magnetic resonance imaging (MRI) and its application in clinical practice, especially for acute stroke diagnosis

# Denis Le Bihan [1957-]

M.D. and Ph.D. in Medicine and Physics
Visiting Professor, Kyoto University
Founding Director, NeuroSpin (Ultrahigh Field MRI Institute), Saclay, France

Denis Le Bihan

## Achievements

Professor Le Bihan developed an imaging method for water diffusion measurement by magnetic resonance imaging (MRI). The diffusion MRI method has saved numerous patients suffering acute stroke as it significantly reduces detection time for diagnosis and treatment. The method can also provide information on nerve fibers, showing the wiring of the brain. It enables healthcare professionals to determine preoperatively the extent of tumor resection, dramatically reducing accidental damage to other regions during surgery.

## Profile

Denis Le Bihan is a pioneer, as he has clinically and scientifically established the basis of diffusion MRI in clinical application, thereby contributing to widespread use of MRI. He is a Knight of the French National Order of Merit, a full member of the French Academy of Sciences and Academy of Technologies, as well as of the European Academy of Sciences.

**Timeline**

| | |
|---|---|
| 1984 | Received M.D. at the University of Paris VI |
| 1987 | Received Ph.D. in Physics at the University of Paris XI |
| 1987 | Visiting Associate, Diagnostic Radiology Department, Clinical Center, National Institutes of Health (NIH), USA (-1990) |
| 1987 | Chief, Diagnostic Radiology Research Section, Clinical Center of the NIH, USA |
| 1991 | Clinical Associate Professor, Georgetown University Hospital |
| 1994 | Chief, Research and Methodology Section, Service Hospitalier Frédéric Joliot, Atomic Energy Commission (CEA), France |
| 1999 | Director, Laboratory of Anatomical and Functional Neuroimaging at Service Hospitalier Frédéric Joliot, CEA, France |
| 2000 | Director, Federative Research Institute on Functional Neuroimaging, France |
| 2005 | Visiting Professor, Kyoto University |
| 2007 | Founding Director, NeuroSpin (Ultrahigh Field MRI Institute), Saclay, France |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1991 | Sylvia Sorkin Greenfield Award in Medical Physics, American Association of Physics in Medicine, USA |
| 1994 | Award of the European Society of Magnetic Resonance in Medicine and Biology |
| 1995 | Kodak Award of the Institute of France for Scientific Achievement in Imaging Research, France |
| 2001 | Gold Medal, International Society of Magnetic Resonance in Medicine, USA |
| 2002 | Honorary Lecturer of the European Congress of Radiology 2002, European Society of Radiology |
| 2002 | Richard Lounsbery Award, United States National Academies of Sciences and the French Academy of Sciences |
| 2003 | Louis D. Foundation Award, Institut de France, France |
| 2004 | Elected Honorary Member, American Society of NeuroRadiology, USA |
| 2009 | Elected Fellow, the European Society for Magnetic Resonance in Medicine and Biology |
| 2010 | JA Vezina Award, Elected Honorary Member, French Canadian Society of Radiology, Canada |
| 2010 | Holst Award, University of Eindhoven/Philips Research, Netherlands |

# AWARD HISTORY

## 1978-1995

### 1978
**Michitaro Tanaka**
*Order of Culture, Japan*

### 1979
**Kinji Imanishi**
*Order of Culture, Japan*

### 1981
**Kenichi Fukui**
*Nobel Prize in Chemistry*

### 1984
**Junichiro Itani**
*Huxley Memorial Medal and Lecture*
**Shigeki Kaizuka**
*Order of Culture, Japan*

### 1986
**Osamu Hayaishi**
*Wolf Prize in Medicine*

### 1987
**Susumu Tonegawa**
*Nobel Prize in Physiology or Medicine*
**Yoneo Ishii**
*Class III Commander of the Most Exalted Order of the White Elephant*
**Takeo Kuwabara**
*Order of Culture, Japan*

### 1989
**Yasutomi Nishizuka**
*Albert Lasker Basic Medical Research Award*
**Sueo Kawabata**
*Moët-Hennessy Louis-Vuitton International Prize*
**Tokindo S. Okada**
*Ross Harrison Prize*
**Tomi Saeki**
*Imperial Prize and Japan Academy Prize*
**Yorio Hinuma**
*Imperial Prize and Japan Academy Prize*

### 1990
**Shigefumi Mori**
*Fields Medal*

### 1992
**Mitsuhiro Shishikura**
*Salem Prize*

### 1993
**Kenichiro Osumi**
*Order of Culture, Japan*

### 1994
**Shigekazu Nagata**
*Emil von Behring-Preis*
**Hisateru Mitsuda**
*Order of Culture, Japan*
**Tadao Umesao**
*Order of Culture, Japan*

### 1995
**Chushiro Hayashi**
*Kyoto Prize, Basic Sciences*

Chapter

# 4

## Frederic Stanley Kipping Award

*"To recognize distinguished contributions to the field of silicon chemistry and, by such example, to stimulate the creativity of others."(American Chemical Society site: www.acs.org)*

## The Henri Poincaré Prize

*"The Prize was created in 1997 to recognize outstanding contributions in mathematical physics, and contributions which lay the groundwork for novel developments in this broad field." (International association of Mathematical Physics site: www.iamp.org)*

## Booker Gold Medal

*"The Medal is awarded for outstanding contributions to telecommunications or a related discipline of direct interest to URSI (International Union of Radio Science)." (International Union of Radio Science site: www.ursi.org/en/)*

## Arthur C. Cope Scholar Award

*"Purpose: To recognize and encourage excellence in organic chemistry. Sponsor: The Arthur C. Cope Fund." (American Chemical Society site: www.acs.org)*

## George W. Morey Award

*"The award recognizes new and original work in the field of glass science and technology. The criterion for winning the award is excellence in publication of work, either experimental or theoretical, done by an individual." (The American ceramic Society site: ceramics.org)*

## Macro Group UK Medal for Outstanding Achievement in Polymer Science

*"Awarded to a scientist, from any country, who is recognised internationally for his/her continued, outstanding achievements in the field of polymer science." (Royal Society of Chemistry site: www.rsc.org)*

## Frank Nelson Cole Prize in Algebra

*"The Frank Nelson Cole Prize in Algebra is awarded every three years for a notable paper in algebra published during the preceding six years." (American Mathematical Society site: www.ams.org)*

## Moët-Hennessy Louis-Vuitton International Prize

*"Science for Art Prizes awarded annually by LVMH Moet Hennessy Louis Vuitton Inc." "The unusual award was established in 1987 to help bring together the professions of science, art and industry." (Stanford University site: news.stanford.edu/pr/94/941013Arc4001.html)*

## John Dawson Prize

*"To commemorate the late John Dawson a specialized award for pioneering advances to plasma physics obtained through simulations will be presented. This is a historical award for past (pre-ICNSP'05) achievements. Official nomination letters for the Dawson Prize (individual or group award) must be sent to the Conference Chairman by July 7, 2005. The letters have to clearly describe the scope of work and its impact." (Numerical Simulation Research Project site: www-nsrp.nifs.ac.jp)*

## Delbert Ray Fulkerson Prize

*"The Fulkerson Prize is awarded for outstanding papers in the area of discrete mathematics." (American Mathematical Society site: www.ams.org)*

## Dannie Heineman Prize for Mathematical Physics

*"This prize is awarded solely for valuable published contributions made in the field of mathematical physics with no restrictions placed on a candidate's citizenship or country of residence." (The American Physical Society site: www.aps.org)*

## Thomson Reuters Citation Laureates

*"Annually, Thomson Reuters citation analysts mine proprietary data from the company's research platform, Web of Knowledge™, to identify the most influential researchers in the categories of chemistry, physics, physiology or medicine, and economics." (Thomson Reuters site: thomsonreuters.com)*

## Salem Prize

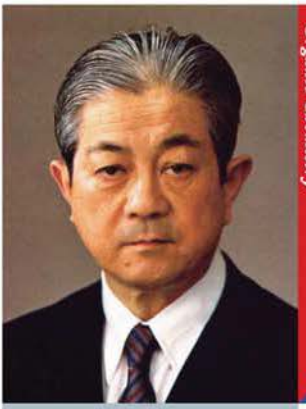
*"The prize, in memory of Raphael Salem, is awarded yearly to young researchers for outstanding contributions to the field of analysis." (American Mathematical Society site: www.ams.org)*

## Leonard Eisenbud Prize

*"Thus, for example, the prize might be given for a contribution to mathematics inspired by modern developments in physics or for the development of a physical theory exploiting modern mathematics in a novel way."(American Mathematical Society site: www.ams.org)*

# Frederic Stanley Kipping Award in Silicon Chemistry 1967

**American Chemical Society**



Organic Chemistry

**Awarded for**

his research on organosilicon chemistry

## Makoto Kumada [ 1920 - 2007 ]

Doctor of Engineering
Professor Emeritus, Kyoto University

Makoto Kumada

## Achievements

Professor Kumada is considered to be the father of polysilane chemistry. In 1953, by methylating the distillation residue from the direct method, which represents an industrial synthetic method of organosilicon compounds, with a Grignard reagent and isolating hexamethyldisilane ($Me_3Si$-$SiMe_3$), he demonstrated that components containing Si-Si bonds were contained in this distillation residue. As a result of Prof. Kumada's discovery, the chemistry of Si-Si bond-containing polysilanes was greatly advanced worldwide. In recognition of this, he was awarded the F. S. Kipping Award in 1967. He was the first Japanese to be honored by the American Chemical Society.

## Profile

In addition to the polysilane chemistry, Makoto Kumada's internationally-renowned research achievements spans many fields, including the chemistry of high-coordinate organosilicon compounds, transition metal catalyzed cross-coupling reactions, and catalytic asymmetric synthesis. Prof. Kumada shaped the frontier of the flood of organometallic chemistry and high-precision organic synthetic chemistry research that rapidly developed from the mid-20th century. The nickel catalyzed cross-coupling reaction reported in 1972 represented the beginning of that field, and his name is etched in history as the Kumada-Tamao-Corriu reaction. Furthermore, Prof. Kumada was an excellent educator, and fostered many outstanding researchers that have led organic chemistry in Japan thereafter, including Professors Hideki Sakurai, Mitsuo Ishikawa, Keiji Yamamoto, Akira Hosomi, Kohei Tamao (see p. 40), Mitsuo Kira, Tamio Hayashi (see p. 42), and Jun-ichi Yoshida.

**Timeline**

| | |
|---|---|
| 1943 | Graduated from Kyoto Imperial University |
| 1943 | Worked at Tokyo Shibaura Electric Co., Ltd. |
| 1950 | Assistant Professor, Osaka City University |
| 1952 | Associate Professor, Osaka City University |
| 1956 | Professor, Osaka City University |
| 1962 | Professor, Kyoto University |
| 1983 | Retired from Kyoto University and entitled Professor Emeritus |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1994 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |

# Moët-Hennessy Louis-Vuitton International Prize 1989

**LVMH Moët Hennessy Louis Vuitton Inc.**


Photo: The University of Shiga Prefecture

Polymer Chemistry

**Awarded for**

research on objective measurement of textile tactile properties

## Sueo Kawabata [ 1931 - 2001 ]

Doctor of Engineering
Professor Emeritus, Kyoto University

Sueo Kawabata

## Achievements

Professor Kawabata significantly contributed to the research on solid mechanics of polymeric materials, including rubber, composites, and fibrous materials. In particular, he developed a technique for the micro-measurement of the mechanical properties of single fibers. He was conferred with the titled prize for his establishment of an objective measurement method of fabric hand, replacing its subjective judgment based on human sensitivity and experience. This method is called the Kawabata evaluation system and is used widely around the world.

## Profile

Apart from Sueo Kawabata's great work, he constantly strived to train and foster younger generations in accordance with his own belief. He also highly contributed to the foundation of and education systems at the graduate school of the University of Shiga Prefecture. After his retirement from The University of Shiga Prefecture, he attempted to establish a research institute for studying fibers and textiles in Nara, his hometown.

**Timeline**

| | |
|---|---|
| 1960 | Received Doctor of Engineering from Kyoto University |
| 1961 | Assistant Professor, Kyoto University |
| 1964 | Research fellow, California Institute of Technology (-1995) |
| 1965 | Associate Professor, Kyoto University |
| 1983 | Professor, Kyoto University |
| 1994 | Retired from Kyoto University and entitled Professor Emeritus |
| 1995 | Professor, The University of Shiga Prefecture |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1987 | Warner Memorial Medal, the Textile Institute, UK |
| 1992 | Millson Award for Invention, the American Association of Textile Chemists and Colorists, USA |
| 1993 | Award for Excellence, the Literati Club, London, UK |
| 1995 | Contribution Award to Textile Science, Technical University of Liberec, Czech Republic |
| 1995 | Honorary Fellow, the Textile Institue, UK |

# Henri Poincaré Prize 2003

## International Association of Mathematical Physics

Mathematics, Physics

**Awarded for**

his lifetime contributions to the foundations of quantum field theory, quantum statistical mechanics, and the theory of operator algebras

## Huzihiro Araki [1932-]

Ph.D. in Science and Doctor of Science
Professor Emeritus, Kyoto University

Huzihiro Araki

### Achievements

Professor Araki studied fundamental problems in quantum physics using highly developed mathematical machinery from the 1960s. He established significant relationships between his foundation of algebraic quantum field theory and type III factors under von Neumann algebra. These pioneering works created a deep stream in mathematical physics and structural theory of von Neumann algebra. He has likewise contributed to the basics of quantum statistical mechanics, and his results are applied to quantum information theory, which has recently experienced significant development.

### Profile

Besides his other prolific works, Huzihiro Araki has contributed to many branches of mathematical and general society. He organized numerous conferences and served on various committees; he served as a member of the screening committee for the Fields Medal of ICM (International Congress of Mathematicians) 1982 and played a significant role as a general secretary of ICM 1990. In addition, he has written several articles for the enlightenment of mathematics, and these are continuing to have a major impact on younger generation of researchers.

**Timeline**

| | |
|---|---|
| 1957 | Received Master's degree from Kyoto University |
| 1960 | Received Ph.D. from Princeton University |
| 1961 | Received Doctor of Science from Kyoto University |
| 1966 | Professor, Kyoto University |
| 1979 | President, the International Association of Mathematical Physics |
| 1993 | Director, Research Institute for Mathematical Sciences, Kyoto University |
| 1996 | Retired from Kyoto University and entitled Professor Emeritus |
| 1996 | Professor, Tokyo University of Science (-2001) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1990 | Grand Prix du Jury du Conseil Scientifique de l'Union des Assurances de Paris, France |
| 2007 | Humboldt Research Award, Alexander von Humboldt Foundation, Germany |

# John Dawson Prize 2005

## International Conference on the Numerical Simulation of Plasmas

Theoretical Physics

**Awarded for**

pioneering advancement of plasma physics obtained through simulations to understand nuclear fusion and plasma

## Tetsuya Sato [ 1939 - ]

Doctor of Engineering
Professor Emeritus,
National Institute for Fusion Science Graduate University for Advanced Studies
Professor, University of Hyogo

Tetsuya Sato

### Achievements

Professor Sato applied simulation science to the theoretical physics field to develop the understanding of nuclear fusion plasma and geoscience.

### Profile

Tetsuya Sato is a recognized authority of simulation science. A Kyoto University graduate, he shifted his research interest from classic theoretical physics to geophysics science using computer science. He has been appointed as director of numerous scientific institutes for nuclear fusion and geoscience. The "Earth simulator," which he directed, was the fastest supercomputer from 2002 to 2005. His style of research has also been acclaimed for its creativity by the Japan Fashion Association.

**Timeline**

| | |
|---|---|
| 1967 | Assistant Professor, Kyoto University |
| 1970 | Received Doctor of Engineering from Kyoto University |
| 1974 | Associate Professor, the University of Tokyo |
| 1980 | Professor, Hiroshima University |
| 1988 | Professor, Nagoya University (held concurrently) |
| 1989 | Director and Professor, Center for Theory and Computer Simulation, National Institute for Fusion Science |
| 1991 | Professor, the Graduate University for Advanced Studies (held concurrently) |
| 1995 | Professor, Nagoya University (held concurrently) |
| 2001 | Director, the Earth Simulator Center, Japan Agency for Marine-Earth Science and Technology |
| 2002 | Professor Emeritus, National Institute for Fusion Science |
| 2003 | Professor Emeritus, the Graduate University for Advanced Studies |
| 2011 | Dean/Professor, the Graduate School of Simulation Studies, University of Hyogo |
| 2013 | Professor Emeritus, University of Hyogo |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2003 | 21st Century Achievement Awards, USA |

# Booker Gold Medal 2008

## International Union of Radio Science

Space Science

**Awarded for**

outstanding contributions to the understanding of nonlinear plasma wave processes, promotion of computer simulations in space plasma physics, and international leadership in plasma wave research

## Hiroshi Matsumoto [1942-]

Doctor of Engineering
President and Professor Emeritus, Kyoto University

Hiroshi Matsumoto

### Achievements

Professor Matsumoto researched Space Radio Science and Space Plasma Space Solar Power Transmission. In 1985, Matsumoto and his colleagues successfully developed a computer simulation code for three-dimensional electromagnetic particles (called KEMPO) in space plasma physics, and contributed to plasma wave research. He conducted the Geotail satellite mission, which observes the Earth's magnetosphere, contributing to global geospace science. He also conducted theoretical, computational, and experimental research on waves in nonlinear plasmas and contributed to the development of microwave power transmission for solar power satellites.

### Profile

Hiroshi Matsumoto received Doctor of Engineering from Kyoto University in 1973. He researched Space Radio Science and Space Plasma Space Solar Power Transmission at the Radio Atmospheric Research Center of Kyoto University. He tirelessly studied each area and won numerous awards for his scientific works and strong leadership. Since 2008, he has been the president of Kyoto University.

**Timeline**

| | |
|---|---|
| 1967 | Received Master's degree from Kyoto University |
| 1967 | Assistant Professor, Faculty of Engineering, Kyoto University |
| 1974 | Associate Professor, Faculty of Engineering, Kyoto University |
| 1981 | Associate Professor, Radio Atmospheric Science Center, Kyoto University |
| 1987 | Professor, Radio Atmospheric Science Center, Kyoto University |
| 1992 | Director, Radio Atmospheric Science Center, Kyoto University |
| 1999 | President, Union Radio-Scientifique Internationale (-2002) |
| 2002 | Director, Radio Science Center for Space and Atmosphere, Kyoto University |
| 2005 | Executive Vice-President, Kyoto University |
| 2006 | Professor Emeritus, Kyoto University |
| 2008 | President, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1993 | NASA Group Achievement Award for GEOTAIL Plasma wave instruments, USA |
| 1998 | NASA Group Achievement Award for GEOTAIL PWI, NASA, USA |
| 1998 | NASA Group Achievement Award for Polar PWI, NASA, USA |
| 1999 | AGU Fellow, American Geophysical Union, USA |
| 2000 | ISAP2000 Paper Award, International Forum for Sustainable Asia and the Pacific, Japan |
| 2003 | IEEE Fellow, IEEE (Institute of Electrical and Electronics Engineers), USA |
| 2004 | Associateships of the Royal Astronomical Society, Royal Astronomical Society, UK |
| 2004 | President Award, Kinki Information Communication Conference, Japan |
| 2006 | Gagarin Medal, Russian Federation of Cosmonautics, Russia |

# Frederic Stanley Kipping Award in Silicon Chemistry 2002

***American Chemical Society***

Organic Chemistry

**Awarded for**

his lifelong research work including his discovery of a hydrogen peroxide oxidation of silicon-carbon bonds

## Kohei Tamao [ *1942 -* ]

Doctor of Engineering
Professor Emeritus, Kyoto University
Science Advisor of RIKEN, and Director of Global Research Cluster, RIKEN

Kohei Tamao

## Achievements

Professor Tamao introduced, in the late 1970s, a new concept in bond activation involving high coordination in modern synthetic organic chemistry. Based on these developments, he discovered a hydrogen peroxide oxidation of silicon-carbon bonds. This oxidation reaction, now known as Tamao (or Tamao-Fleming) oxidation, represents the only existing general method for the synthesis of alcohols from organosilicon compounds, greatly enhancing the synthetic utility of organosilicon compounds.

## Profile

Kohei Tamao and his supervisor Makoto Kumada (see p. 35) have developed a type of cross coupling reaction, called Kumada-Tamao-Corriu coupling. The reaction is notable for being among the first reported catalytic cross-coupling methods. Tamao also has consistently displayed leadership in the development of new fields of molecular, material and element science by blending a keen sense of modern synthetic organic chemistry with classic main-group element chemistry.

**Timeline**

| | |
|---|---|
| 1970 | Assistant Professor, Faculty of Engineering, Kyoto University |
| 1971 | Received Doctor of Engineering from Kyoto University |
| 1986 | Associate Professor, Kyoto University |
| 1993 | Professor, Institute for Chemical Research, Kyoto University |
| 2005 | Professor Emeritus, Kyoto University |
| 2005 | Director, RIKEN Frontier Research System |
| 2008 | Director, RIKEN Advanced Science Institute |
| 2013 | Science Advisor, RIKEN |
| 2013 | Director, Global Research Cluster, RIKEN |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1994 | Fellow, the Royal Society of Chemistry, FRSC CChem |
| 1999 | The Chemical Society of Japan (CSJ) Award, the Chemical Society of Japan, Japan |
| 2004 | Medal with Purple Ribbon, Japan |
| 2007 | Japan Academy Prize, the Japan Academy, Japan |
| 2011 | Person of Cultural Merit, Japan |

# Delbert Ray Fulkerson Prize 2003

**American Mathematical Society**

Mathematical Science

**Awarded for**

developing a combinatorial strongly polynomial algorithm for minimizing submodular functions

## Satoru Fujishige [1947-]

Doctor of Engineering

Professor Emeritus, Osaka University and Kyoto University

Satoru Fujishige

## Achievements

Professor Fujishige provided a combinatorial, strongly polynomial time algorithm for submodular function minimization in collaboration with Satoru Iwata and Lisa Fleischer in 1999 (which was also independently achieved by Alexander Schrijver). This resolved a long-standing open problem in the history of submodular function minimization algorithms in discrete optimization.

## Profile

Satoru Fujishige received Doctor of Engineering from Kyoto University in 1975. He then became research associate and one year later assistant professor to work with Professor Masao Iri at the University of Tokyo, where he started research in combinatorial and discrete optimization, especially on matroids, networks, and submodular functions. After research at University of Tsukuba and Osaka University, he became a professor at Research Institute for Mathematical Sciences at Kyoto University in 2003.

**Timeline**

| | |
|---|---|
| 1975 | Research Associate, the University of Tokyo |
| 1976 | Assistant Professor, the University of Tokyo |
| 1979 | Associate Professor, University of Tsukuba |
| 1982 | Visiting Scholar, University of Bonn |
| 1988 | Professor, University of Tsukuba |
| 1997 | Professor, Osaka University |
| 2003 | Professor Emeritus, Osaka University |
| 2003 | Professor, Kyoto University |
| 2009 | Director, Research Institute for Mathematical Sciences, Kyoto University |
| 2012 | Professor Emeritus, Kyoto University |

# Arthur C. Cope Scholar Award 2008

***American Chemical Society***

Organic Chemistry

**Awarded for**

his design of Chiral Transition Metal Catalysts and Development of New Catalytic Asymmetric Reactions

## Tamio Hayashi [ *1948-* ]

Doctor of Engineering
Professor Emeritus, Kyoto University
Principal Scientist, Institute of Materials Research and Engineering, Singapore
Professor, National University of Singapore, Singapore

Tamio Hayashi

## Achievements

Professor Hayashi developed new selective organic transformations catalyzed by transition metal complexes, especially catalytic asymmetric reactions. He has been highly successful in his conceptual design of new chiral ligands and their use for catalytic asymmetric reactions.

## Profile

Tamio Hayashi studied organosilicon chemistry under his supervisor Makoto Kumada (see p. 35) at Kyoto University, and then he started his studies on organotransition metal chemistry directed towards organic synthesis. He has published 410 original papers with a total citation number of around 29,000 (H-index 89) as of January 2014. In ISI Highly Cited.com, a part of the ISI Web of Knowledge, Tamio Hayashi has been listed as one of the 272 most highly cited chemists in the world since 2003.

**Timeline**

| | |
|---|---|
| 1975 | Received Doctor of Engineering from Kyoto University |
| 1975 | Assistant Professor, Kyoto University |
| 1976 | Postdoctoral Fellow, Colorado State University |
| 1989 | Professor, Hokkaido University |
| 1994 | Professor, Kyoto University |
| 2012 | Retired from Kyoto University and entitled Professor Emeritus |
| 2012 | Principal Scientist, Institute of Materials Research and Engineering, Singapore |
| 2013 | Professor, National University of Singapore, Singapore |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1991 | IBM Japan Science Prize, IBM, Japan |
| 2003 | The Chemical Society of Japan (CSJ) Award, the Chemical Society of Japan, Japan |
| 2004 | Thomson Scientific Research Front Award, Thomson Reuters |
| 2007 | Ryoji Noyori Prize, The Society of Synthetic Organic Chemistry, Japan |
| 2010 | The Khwarizmi International Award, Iranian Research Organization for Science and Technology, Iran |
| 2010 | Medal with Purple Ribbon, Japan |

# Dannie Heineman Prize for Mathematical Physics 2013

## American Physical Society

Mathematics

**Awarded for**

profound developments in integrable systems and their correlation functions in statistical mechanics and quantum field theory, making use of quantum groups, algebraic analysis and deformation theory*

## Tetsuji Miwa [1949-]

Doctor of Science
Professor, Kyoto University

Tetsuji Miwa

### Achievements

Professor Miwa is famous for solitons and exactly solvable lattice models in connection with the representation theory of affine Lie algebras. In collaboration with Michio Jimbo and other people, he studied the correlation functions of the integrable quantum spin chains.

### Profile

In 1973, Tetsuji Miwa moved from the University of Tokyo, where he graduated from, to the Research Institute for Mathematical Sciences, Kyoto University, and joined the algebraic analysis group led by Mikio Sato (see p. 21). He worked with Mikio Sato and Michio Jimbo on the isomonodromic deformation theory and its application to the 2-dimensional Ising model. In 2000, he moved to the mathematics department and stayed till his retirement in 2013. Since then, he joined the newly established Institute for Liberal Arts and Sciences, Kyoto University.

**Timeline**

| | |
|---|---|
| 1981 | Received Doctor of Science from Kyoto University |
| 1993 | Professor, Research Institute for Mathematical Sciences, Kyoto University |
| 2000 | Professor, Graduate School of Science, Kyoto University |
| 2013 | Professor, Institute for Liberal Arts and Sciences, Kyoto University |

* *Authority: American Physical Society*
*(http://www.aps.org/programs/honors/prizes/prizerecipient.cfm?first_nm=Michio&last_nm=Jimbo&year=2013)*

# George W. Morey Award 2000

**The American Ceramic Society**

Materials Science

**Awarded for**

the best innovative contribution to the field of Glass and Optical Materials in the world

## Kazuyuki Hirao [1951-]

Doctor of Engineering
Professor, Kyoto University

Kazuyuki Hirao

### Achievements

Professor Hirao has contributed enormously to the development of photonics glasses. He has proposed novel methods for the functional expressions applied in optical functional devices produced with inorganic materials. He has published more than 600 scholarly publications in inorganic material sciences, applied physics, theoretical chemistry, and laser chemistry. His laboratory is one of the most advanced in the world for laser processing and research.

### Profile

Kazuyuki Hirao is a pioneer in materials science for glasses using new technology. He owns more than 155 patents from his innovation and has delivered more than 200 lectures on his expertise. Especially, he is renowned as the inventor of optical waveguides inside glasses irradiated by a femtosecond laser.

**Timeline**

| | |
|---|---|
| 1979 | Received Doctor of Engineering from Kyoto University |
| 1979 | Assistant Professor, Kyoto University |
| 1987 | Associate Professor, Kyoto University |
| 1998 | Professor, Kyoto University (-present) |
| 2005 | Leader, Kyoto Intellectual Cluster Group (-present) |
| 2006 | Director, Kyoto City Innovation Center (-present) |
| 2013 | Director of Nano Technology Hub, Center for the Promotion of Interdicsiplinary Education and Research (C-PIER), Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1990 | Gottardi Prize, International Commission on Glass |
| 2005 | Otto Schott Research Award, the Ernst Abbe Fund, Germany |
| 2006 | Fellow, the American Ceramic Society, USA |
| 2008 | International Academic Contribution Award, China |
| 2012 | Medal with Purple Ribbon, Japan |

# Thomson Reuters Citation Laureates 2010

**Thomson Reuters**

Material Chemistry

**Awarded for**

the design and development of porous metal-organic frameworks, whose applications include hydrogen and methane storage, gas purification, and gas separation

## Susumu Kitagawa [ 1951 - ]

Doctor of Engineering
Professor, Kyoto University
Director, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University

Susumu Kitagawa

## Achievements

Professor Kitagawa is a pioneer in the field of porous coordination polymers (PCPs) — also known as metal-organic frameworks — which are nano- to meso-sized cage-like structures with hollow pores capable of accommodating gas molecules. PCPs can be applied to a wide range of industrial processes. As proof of Kitagawa's significant contributions to PCP research, his work published over the past two decades have been cited among the top 0.1% of papers in his field, earning him a Thomson Reuters Citation Laureates for 2010.

## Profile

Susumu Kitagawa received his Doctor of Engineering from Kyoto University in 1979. For the next 13 years, he continued his research at Kinki University before becoming a professor at Tokyo Metropolitan University. After joining Kyoto University in 1998 as a professor, he then went on to become deputy director of the Institute for Integrated Cell-Material Sciences (WPI-iCeMS) in 2007, and was named director in 2013.

**Timeline**

| | |
|---|---|
| 1979 | Received Doctor of Engineering from Kyoto University |
| 1979 | Assistant Professor, Kinki University |
| 1983 | Lecturer, Kinki University |
| 1986 | Visiting Scientist, Texas A&M University |
| 1988 | Associate Professor, Kinki University |
| 1992 | Professor, Tokyo Metropolitan University |
| 1998 | Professor, Graduate School of Science, Kyoto University |
| 1999 | Professor, Graduate School of Engineering, Kyoto University (-present) |
| 2007 | Deputy Director, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University |
| 2013 | Director, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2007 | Earl L. Muetterties Memorial Lecturers, University of California, Berkeley, USA |
| 2009 | The Chemical Society of Japan (CSJ) Award, the Chemical Society of Japan, Japan |
| 2011 | Medal with Purple Ribbon, Japan |
| 2012 | Honorary Fellow, Chemical Research Society of India, India |
| 2013 | Reona Ezaki Award, the Science and Technology Promotion Foundation of Ibaraki, Japan |
| 2013 | De Gennes Prize, Royal Society of Chemistry, UK |
| 2013 | Kyoto University Shi-Shi Award, Kyoto University, Japan |

# Macro Group UK Medal for Outstanding Achievement in Polymer Science 2012

**Royal Society of Chemistry**

Polymer Chemistry

**Awarded for**

his seminal work on the development of metal catalysed living radical polymerisation also on living cationic polymerisation and the synthesis of designed functional polymers

## Mitsuo Sawamoto [ 1951 - ]

Ph.D. in Engineering
Professor, Kyoto University

Mitsuo Sawamoto

## Achievements

Professor Sawamoto has conducted studies in the field of polymer chemistry and polymer synthesis, including cationic and radical polymerization. He has contributed greatly to the establishment of controlled polymerization by dormant species, which is widely accepted as a standard principle in precise polymerization. This achievement created a new approach toward research in polymer science.

## Profile

Mitsuo Sawamoto is globally recognized, and his work has drawn the keen interest of various scholars; his academic papers are highly cited in Japan, for example. Indeed, between 1997 and 2001, he was one of the most cited scholars globally in organic chemistry. This attention can be attributed to the quality of his research, which has influential impact on basic research efforts as well as applications to society.

**Timeline**

| | |
|---|---|
| 1979 | Received Doctor of Engineering from Kyoto University |
| 1979 | Postdoctoral Fellow, Kyoto University |
| 1980 | Visiting Scholar, the University of Akron |
| 1981 | Assistant Professor, Kyoto University |
| 1991 | Lecturer, Kyoto University |
| 1993 | Associate Professor, Kyoto University |
| 1994 | Professor, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2001 | Arthur K. Doolittle Award, American Chemical Society, USA |

# Arthur C. Cope Scholar Award 2011

**American Chemical Society**

Organic Chemistry

**Awarded for**

discovering and commercially developing chiral phase-transfer catalyst (Maruoka Catalyst®) for artificial amino acid synthesis

## Keiji Maruoka [ 1953- ]

Ph.D. in Chemistry
Professor, Kyoto University

Keiji Maruoka

## Achievements

Professor Maruoka made an important and significant contribution to modern phase-transfer chemistry. He designed and synthesized non-natural, C2 symmetric chiral phase-transfer catalysts derived from optically pure binaphthol. He also succeeded in simplifying these phase transfer catalysts with high performance and the general applicability. Those catalysts are commercially available as Maruoka Catalyst® and Simplified Maruoka Catalyst®, respectively, for large-scale production of artificial amino acids.

## Profile

In 1976, Keiji Maruoka graduated from Kyoto University. In 1980, he received his Ph.D. from University of Hawaii. After researches at Nagoya University and Hokkaido University, currently he is a professor of chemistry in Kyoto University since 2000. He has a wide range of research interests in synthetic organic chemistry, particularly asymmetric organocatalysis. He involves "High-Performance Organocatalyst Project" which aims at the design and synthesis of a series of truly efficient organocatalysts for practical organic transformations.

**Timeline**

| | |
|---|---|
| 1980 | Received Ph.D. in Chemistry at the University of Hawaii |
| 1980 | Assistant Professor, Nagoya University |
| 1985 | Lecturer, Nagoya University |
| 1990 | Associate Professor, Nagoya University |
| 1995 | Professor, Hokkaido University (-2001) |
| 2000 | Professor, Kyoto University |
| 2009 | Hold "Organocatalytic Chemistry Special Laboratory" |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2004 | Nagoya Silver Medal, Banyu Life Science Foundation International, Japan |
| 2007 | The Chemical Society of Japan (CSJ) Award, The Japan Chemical Society, Japan |
| 2007/2008 | Novartis Chemistry Lectureship Award, Novartis |
| 2011 | Humboldt Research Award, Alexander von Humboldt Foundation, Germany |
| 2011 | Medal with Purple Ribbon, Japan |

# Salem Prize 1992

## American Mathematical Society

Mathematics

**Awarded for**

proving a conjecture of Fatou from 1920 and for also proving that the boundary of the Mandelbrot set has Hausdorff dimension two, with the conformation of a conjecture by Mandelbrot and Milnor

## Mitsuhiro Shishikura [1960-]

Doctor of Science
Professor, Kyoto University

Mitsuhiro Shishikura

### Achievements

Professor Shishikura researches in the field of complex dynamics, which is the dynamical systems defined by complex analytic functions. He developed the theory the quasiconformal surgery and as an application, he solved conjectures by Fatou and by Sullivan on the number of non-repelling periodic cycles and Fatou components. He proved that the boundary of the Mandelbrot set, a fractal set which is well-known for its complexity and beauty, has Hausdorff dimension two. This confirmed the conjecture proposed by Mandelbrot and Milnor.

### Profile

In 1988, Mitsuhiro Shishikura received his Doctor of Science from Kyoto University. From 1989 to 1994, he worked at the Tokyo Institute of Technology as associate and assistant professor. In 1994, he moved to the University of Tokyo as an associate professor. In 1999, he became a professor at Hiroshima University. Since 2001, he has been a professor at Kyoto University.

**Timeline**

| | |
|---|---|
| 1988 | Received Doctor of Science, Kyoto University |
| 1988 | Research Fellow, Max-Planck-Institut für Mathematik, Germany |
| 1988 | Member, Institute for Advanced Study, USA |
| 1989 | Assistant Professor, Tokyo Institute of Technology |
| 1992 | Associate Professor, Tokyo Institute of Technology |
| 1994 | Assistant Professor, the University of Tokyo |
| 1999 | Professor, Hiroshima University |
| 2001 | Professor, Kyoto University |

# Frank Nelson Cole Prize in Algebra 2003

***American Mathematical Society***

Mathematics

**Awarded for**
his work in representation theory and geometry

## Hiraku Nakajima [ 1962 - ]

Doctor of Science
Professor, Kyoto University

Hiraku Nakajima

## Achievements

Professor Nakajima contributed to the representation of theory and geometry. He used his notion of "quiver varieties" to construct irreducible integrable highest weight modules for Kac-Moody algebras associated with a symmetric Cartan matrix, and finite dimensional representations of quantum loop algebras. He also constructed representations of the Heisenberg algebra on the direct sum the homology of the Hilbert schemes of points on a quasi-projective surface.

## Profile

Hiraku Nakajima received Doctor of Science from the University of Tokyo in 1991. He was originally interested in geometry of moduli spaces, and gradually moved to representation theory after the discovery of quiver varieties. His landmark papers, for which he was awarded the Cole Prize, were written in 1997, 1998, and 2001.

**Timeline**

| | |
|---|---|
| 1987 | Assistant Professor, the University of Tokyo |
| 1991 | Doctor of Science from the University of Tokyo |
| 1992 | Associate Professor, Tohoku University |
| 1995 | Associate Professor, the University of Tokyo |
| 1997 | Associate Professor, Graduate School of Science, Kyoto University |
| 2000 | Professor, Graduate School of Science, Kyoto University |
| 2008 | Professor, Research Institute for Mathematical Sciences, Kyoto University |

# Leonard Eisenbud Prize 2008

## American Mathematical Society

Mathematical Science

**Awarded for**

discovering of the relation between the number of black hole microstates and the Gromov-Witten invariants

## Hirosi Ooguri [ 1962 - ]

Doctor of Science
Fred Kavli Professor, California Institute of Technology
Principal Investigator, Kavli Institute for the Physics and Mathematics of the Universe, the University of Tokyo
Advisory Board Member, Research Institute for Mathematical Sciences, Kyoto Univerisity

Hirosi Ooguri

### Achievements

Professor Ooguri was awarded the inaugural Leonard Eisenbud Prize for Mathematics and Physics from the American Mathematical Society with his two collaborators for their "beautiful and highly unexpected proposal that the counting of black hole sates, in certain string theories obtained by compactification on a Calabi-Yau manifold X, can be expressed in terms of the topological string partition function of X."

### Profile

Hirosi Ooguri is a leading theoretical physicist working on quantum field theory and quantum gravity. He is developing theoretical tools to apply superstring theory to fundamental questions in high-energy physics, astrophysics, and cosmology. He was an Associate Professor at Kyoto University in 1990-1994 and a Full Professor at the University of California at Berkeley in 1994-2000. Since 2000, he has been at California Institute of Technology, where he is now Fred Kavli Professor of Theoretical Physics and Mathematics and the Deputy Chair of the Division of Physics, Mathematics, and Astronomy.

**Timeline**

| | |
|---|---|
| 1986 | Received Master's degree from Kyoto University |
| 1986 | Assistant Professor, the University of Tokyo |
| 1988 | Research Associate, Institute for Advanced Study, Princeton |
| 1989 | Assistant Professor, the University of Chicago |
| 1989 | Received Doctor of Science from the University of Tokyo |
| 1990 | Associate Professor, Research Institute for Mathematical Sciences (RIMS), Kyoto University |
| 1994 | Professor of Physics at the University of California at Berkeley |
| 1996 | Senior Faculty Scientist, the Lawrence Berkeley National Laboratory |
| 2000 | Professor of Theoretical Physics, California Institute of Technology |
| 2007 | Fred Kavli Professor of Theoretical Physics, California Institute of Technology |
| 2007 | Principal Investigator, Kavli Institute for the Physics and Mathematics, the University of Tokyo |
| 2011 | Member of the Board of Trustees, Aspen Center for Physics |
| 2013 | Member of the Advisory Board of RIMS, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2009 | Humboldt Research Award, Alexander von Humboldt-Foundation, Germany |
| 2012 | Simons Investigator Award (inaugural award), Simons Foundation, USA |

# AWARD HISTORY

## 1996-2007

### 1996
**Shigetada Nakanishi**
*Keio Medical Science Prize*

### 1998
**Yoshio Masui**
*Albert Lasker*
*Basic Medical Research Award*

### 1999
**Susumu Fuma**
*Imperial Prize and Japan Academy Prize*

### 2000
**Kimishige Ishizaka**
*Japan Prize*
**Kazuyuki Hirao**
*George W. Morey Award*

### 2001
**Ryoji Noyori**
*Nobel Prize in Chemistry*

### 2002
**Kohei Tamao**
*Frederic Stanley Kipping Award in Silicon Chemistry*
**Koichi Tanaka**
*Keio Medical Science Prize*
**Mikio Sato**
*Wolf Prize in Mathematics*

### 2003
**Huzihiro Araki**
*Henri Poincaré Prize*
**Satoru Fujishige**
*Delbert Ray Fulkerson Prize*
**Hiraku Nakajima**
*Frank Nelson Cole Prize in Algebra*
**Kazuhiko Nishijima**
*Order of Culture, Japan*

### 2005
**Makoto Nagao**
*Japan Prize*
**Masatoshi Takeichi**
*Japan Prize*
**Tetsuya Sato**
*John Dawson Prize*
**Yoshinori Fujiyoshi**
*Keio Medical Science Prize*
**Toshio Sawada**
*Order of Culture, Japan*
**Kazuya Kato**
*Imperial Prize and Japan Academy Prize*

### 2006
**Kiyosi Itô**
*Carl Friedrich Gauss Prize*

### 2007
**Mitsuru Hashida**
*AAPS Research Achievement Award in Pharmaceutics and Drug Delivery*

# Chapter 5

## Schaudinn-Hoffman-Plakette

*"Die Plakette wird an hervorragende Ärzte und Wissenschaftler vergeben, die sich um die Erforschung, Behandlung und Bekämpfung von infektiösen Erkrankungen der Haut und der angrenzenden Schleimhäute, vor allem der Geschlechtskrankheiten, besonders verdient gemacht haben." (The German Society of Dermatology site: www.derma.de)*

## Keio Medical Science Prize

*"The Keio Medical Science Prize gives recognition to the outstanding and creative achievements of researchers in the fields of medicine and life sciences, in particular those contributing to scientific developments in medicine." (Keio University Medical Science Fund site: www.ms-fund.keio.ac.jp)*

## AAPS Research Achievement Award in Pharmaceutics and Drug Delivery

*"AAPS Awards Program provides a wonderful opportunity for scientists and graduate students to be recognized and honored for their valuable contributions to the pharmaceutical sciences." (American Association of Pharmaceutical Scientists site: www.aaps.org)*

## University College Dublin Ulysses Medal

*"The UCD Ulysses Medal is the highest honour that the university can bestow." "It is awarded to individuals whose work has made an outstanding global contribution." (University College Dublin site: www.ucd.ie)*

## Ross Harrison Prize

*"The Ross Harrison Prize was established in 1981 to recognize scientists whose contributions have significantly advanced the field of developmental biology, and has come to be acknowledged as the premier recognition of achievement in the field. The Harrison Prize is awarded once every four years" (The International Society of Developmental Biologists site: www.developmental-biology.org)*

## Robert-Koch Award

*"The Robert Koch Award with prize money of 100,000 € is one of the most prestigious scientific commendations in Germany. It is awarded annually, under the patronage of the German Minister of Health, for outstanding and internationally recognised scientific achievements." (Robert-Koch-Stiftung e.V. site: www.robert-koch-stiftung.de)*

## Emil von Behring-Preis

*"Der Preis soll verliehen werden für besondere wissenschaftliche Leistungen auf medizinischen, veterinärmedizinischen und naturwissenschaftlichen Gebieten mit besonderer Bevorzugung der Immunbiologie und Seuchenbekämpfung." (Philipps-Universität Marburg site: www.uni-marburg.de)*

## Canada Gairdner International Award

*"The Canada Gairdner International Awards recognize and celebrate the work of the world's best biomedical researchers." "The Canada Gairdner Awards are supported by the governments of Canada, Alberta and Ontario." (The Gairdner Foundation site: www.gairdner.org)*

# Schaudinn-Hoffmann-Plakette 1965

***Germany***


Photo: Osaka Medical College

*Dermatology*

**Awarded for**

his contribution to the advancement of dermatology from histopathological and cell immunological approaches

## Shin-ichi Matsumoto [ *1884 - 1984* ]

M.D. and Ph.D. in Medicine
Professor Emeritus, Kyoto University
Founder President, Osaka Medical College

Shin-ichi Matsumoto

### Achievements

Professor Matsumoto studied spirochetes to understand the mechanism of syphilis from various approaches, including histopathology and cell immunology. He also conducted research on skin carcinoma, transdermal and transmucosal immunization, immunization for bacterial infection, symmetric hyperkeratosis, and several other types of skin diseases.

### Profile

Shin-ichi Matsumoto was renowned for his comprehensive study of syphilis and other contributions to dermatology. After his career at Kyoto Imperial University, he strived toward the establishment of the Osaka Medical College and served as the school's dean for more than 20 years. He was an honorary member of dermatology associations in other countries, such as Germany, the USA, Denmark, Hungary, Greece, Italy, and Australia.

**Timeline**

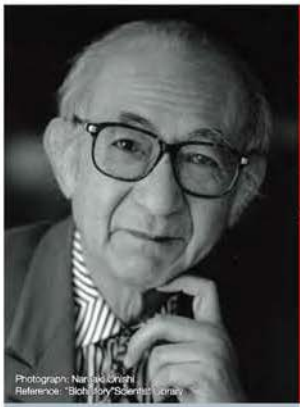
| | |
|---|---|
| 1909 | Graduated from Kyoto Imperial University College of Medicine |
| 1913 | Associate Professor, Kyoto Imperial University College of Medicine |
| 1919 | Professor, Kyoto Imperial University Faculty of Medicine |
| 1938 | Dean, Faculty of Medicine, Kyoto Imperial University |
| 1944 | Retired from Kyoto Imperial University |
| 1946 | Professor Emeritus, Kyoto University |
| 1946 | President, Osaka Medical College |
| 1956 | President, Japanisch-Deutsches Kulturinstitut |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1955 | Großes Verdienstkreuz, Germany |
| 1966 | Person of Cultural Merit, Japan |
| 1976 | Grand Cordon of the Order of the Sacred Treasure, Japan |

# Ross Harrison Prize 1989

**International Society of Developmental Biologists**



Photograph: Nanao Onishi
Reference: "Biohistory" Scientist Library

Developmental Biology

**Awarded for**

his contribution to the research field of developmental biology

## Tokindo S. Okada [ *1927-* ]

Doctor of Science
Professor Emeritus, Kyoto University

Tokindo S. Okada

### Achievements

Professor Okada has contributed to the advancement of developmental biology. He focused on transdifferentiation, one of the unique features of cells in which one mature cell transforms into another type of mature cell. He used his original methodology for culturing lens cells to demonstrate the transdifferentiation and celler plasticity of a neural retina cell into a lens cell; his serial observation lasted 100 days. Including this discovery, Professor Okada's work in organ regenerations has influenced the field of developmental biology, in which a series of focused research are conducted, such as on embryonic and induced pluripotent stem cells.

### Profile

After graduation from Kyoto University, Tokindo S. Okada conducted research in Edinburgh in the UK and in the USA, and then returned to Kyoto University to start a laboratory at the then newly opened Department of Biophysics. He introduced cell culture and immunocytochemical techniques in Japan to promote further studies. In addition to his research activities, he mentored young scientists with his unique philosophy in science. After his early retirement from the National Institute for Basic Biology, he has actively voiced his views on the relationship between science and culture. He has also served as President of the Kyoto City music art cultural Promoting Foundation. Currently, he is an honorary advisor of JT Biohistory Research Hall and has authored a number of science books.

**Timeline**

| | |
|---|---|
| 1954 | Assistant Professor, Kyoto University |
| 1957 | Visiting Researcher, University of Edinburgh |
| 1959 | Received Doctor of Science from Kyoto University |
| 1960 | Lecturer, Kyoto University |
| 1961 | Associate Professor, Kyoto University |
| 1964 | Research Fellow, Carnegie Institution for Science |
| 1967 | Professor, Kyoto University (-1990) |
| 1979 | President of the Japanese Society of Developmental Biologists (-1982) |
| 1981 | President of the International Society of Developmental Biologists (-1985) |
| 1984 | Director, National Institute for Basic Biology, National Institutes of Natural Sciences |
| 1989 | Professor Emeritus, Kyoto University |
| 1989 | President of National Institutes of Natural Sciences (-1990) |
| 1993 | Founding Director, JT Biohistory Research Hall (-2002) |
| 2002 | Honorary Advisor, JT Biohistory Research Hall |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1989 | Alcon Novartis Hida Memorial Award, Alcon Novsrtis Hida Memorial Award, Alcon, Novartis, Japan |
| 1990 | Medal with Purple Ribbon, Japan |
| 1995 | Person of Cultural Merit, Japan |
| 2007 | Order of Culture, Japan |

# Keio Medical Science Prize 1996

**Keio University Medical Science Fund**

Neuroscience, Molecular Biology

**Awarded for**

discovering structures and functions of receptor molecules

## Shigetada Nakanishi [ 1942 - ]

M.D. and Ph.D. in Medical Science
Member of the Japan Academy
Professor Emeritus, Kyoto University
Director, Osaka Bioscience Institute

Shigetada Nakanishi

### Achievements

Professor Nakanishi elucidated the characteristic precursor architectures of various neuropeptides and vasoactive peptides by introducing recombinant DNA technology. Subsequently, he established a novel functional cloning strategy for membrane receptors and ion channels and characterized molecular structures and the regulatory mechanisms of NMDA-type and G protein-coupled type of glutamate receptors as well as several peptide receptors. He also greatly contributed to the understanding of fundamental mechanisms of functional neural networks.

### Profile

Shigetada Nakanishi was initially trained as a biochemist and shifted his research interest into molecular biology and neuroscience. He was Professor of Kyoto University from 1981 to 2005 and is currently the Director of Osaka Bioscience Institute. His main area of research has been molecular neuroscience, focusing on molecular mechanisms of glutamate receptor functions and integrative synaptic mechanisms of the neural network.

**Timeline**

| | |
|---|---|
| 1966 | Graduated from Kyoto University Faculty of Medicine, M.D. |
| 1971 | Completed his Doctor's degree in Medicine at Kyoto University |
| 1971 | Visiting Associate, National Cancer Institute, National Institutes of Health, USA (-1974) |
| 1974 | Received Ph.D. in Medical Science from Kyoto University |
| 1974 | Associate Professor, Kyoto University |
| 1981 | Professor, Faculty of Medicine, Kyoto University (-2005) |
| 1999 | Professor, Graduate School of Biostudies, Kyoto University (-2005) |
| 2000 | Dean, Faculty of Medicine, Kyoto University (-2002) |
| 2005 | Professor Emeritus, Kyoto University |
| 2005 | Director, Osaka Bioscience Institute |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1995 | Distinguished Achievement Award, Bristol-Myers Squibb, USA |
| 1995 | Foreign Honorary Member, American Academy of Arts and Sciences, USA |
| 1997 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 2000 | Foreign Associate, National Academy of Sciences, USA |
| 2006 | Person of Cultural Merit, Japan |
| 2007 | The Gruber Neuroscience Prize, the Gruber Foundation, USA |
| 2009 | Member, the Japan Academy, Japan |

# Keio Medical Science Prize 2002

**Keio University Medical Science Fund**

*Organ Transplantation*

**Awarded for**

the establishment and development of the living-donor liver transplantation system

## Koichi Tanaka [ *1942 -* ]

M.D. and Ph.D. in Medicine
Professor Emeritus, Kyoto University
President, Kobe International Frontier Medical Center

Koichi Tanaka

## Achievements

Professor Tanaka pioneered the living-donor liver transplantation system, which has become the standard of care for treating patients with severe liver failure in Japan. In response to ethical issues over the use of organs from deceased donors — that limited liver transplantations, resulting in low supplies of donated organs and a high mortality of patients with end-stage liver failure — Tanaka established an advanced transplantation method and perioperative management. As a result of his determination and innovative efforts to implement this procedure and safety standards, he has played a central role in the global dissemination and education of living-donor liver transplantations. Over 1000 cases have been carried out under his supervision or with his consultation.

## Profile

Koichi Tanaka is actively engaged in the development of therapeutics for pediatric patients needing surgical treatments. The living-donor liver transplantation system is one of his major achievements and was introduced internationally with his strong leadership. He was appointed as a professor of Transplantation and Immunology and a director of Kyoto University Hospital from 1995-2005. Currently, he serves as the president of Kobe International Frontier Medical Center (KIFMEC).

**Timeline**

| | |
|---|---|
| 1966 | Graduated from Kyoto University Faculty of Medicine, M.D. |
| 1966 | Resident, Kyoto University Hospital (-1968) |
| 1968 | Surgeon, Shimane Prefectural Hospital (-1975) |
| 1975 | Assistant Professor, Department of Surgery, Kyoto University Hospital (-1995) |
| 1981 | Received Ph.D. from Kyoto University |
| 1985 | Lecturer, Department of Surgery, Kyoto University Hospital (-1993) |
| 1995 | Associate Professor, Department of Surgery, Kyoto University Hospital (-1995) |
| 1995 | Professor and Director, Department of Transplantation and Immunology, Kyoto University Hospital (-2005) |
| 2001 | Hospital Director, Kyoto University Hospital (-2005) |
| 2004 | President, Institute of Biomedical Research and Innovation (IBRI) (-2010) |
| 2005 | Professor Emeritus, Kyoto University |
| 2005 | Vice President, Kobe City General Hospital (2005.4-2005.11) |
| 2005 | Technical Advisor, Kobe City General Hospital (2005.12-present) |
| 2006 | Received an honorary degree in Medicine and Surgery from Padua University, Italy |
| 2009 | President, Foundation for Kobe International Medical Alliance (-2012) |
| 2010 | Technical Advisor, Foundation for Biomedical Research and Innovation (-2012) |
| 2012 | Vice-President, Foundation for Kobe International Medical Alliance (-present) |
| 2013 | President, Kobe International Frontier Medical Center |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2004 | Lifetime Achievement Award, Asian Society of Transplantation |
| 2013 | Maharshi Sushruta Gnyaanpeeth Sanmaan Award for Research in Transplantation Biology, Smt. G. R. Doshi Smt. K. M. Mehta Institute of Kidney Disesses and Research Center and H. L. Trivedi Institute of Transplantation Sciences, India |

# Robert-Koch Award 2012

***The Koch Foundation***

*Biochemistry and Molecular Immunology*

**Awarded for**

his pioneering work in immune response and the understanding of viral infections

## Tasuku Honjo [ *1942 -* ]

M.D. and Ph.D. in Medical Science
Member of the Japan Academy
Professor Emeritus and Visiting Professor, Kyoto University
Chairman, Board of Directors, Shizuoka Prefectural University Corporation

Tasuku Honjo

### Achievements

Professor Honjo elucidated the mechanism of producing antibodies by class switch recombination of the immunoglobulin gene, and discovered the AID (activation-induced cytidine deaminase) enzyme.

### Profile

Tasuku Honjo is well known for his discovery of activation-induced cytidine deaminase that is essential for class switch recombination and somatic hypermutation. He has established the basic conceptual framework of class switch recombination starting from the discovery of DNA deletion (1978) and S regions (1980), followed by elucidation of the whole mouse immunoglobulin heavy-chain locus. His contribution further extended to cDNA cloning of IL-4 and IL-5 cytokines involved in class switching and IL-2 receptor alpha chain. Aside from class switching recombination, he discovered PD-1 (programmed cell death 1), a negative coreceptor at the effector phase of immune response and showed that PD-1 modulation contributes to treatments of viral infection, tumor and autoimmunity. In addition, he is known to be a discoverer of RBP-J, a nuclear protein that interacts with the intracellular domain of Notch in the nucleus. Notch/RBP-J signaling has been shown to regulate a variety of cell lineage commitment including T and B cells.

**Timeline**

| | |
|---|---|
| 1966 | Graduated from Kyoto University Faculty of Medicine, M.D. |
| 1967 | Joined Kyoto University Graduate School of Medicine |
| 1975 | Received Ph.D. in Medical Science from Kyoto University |
| 1971 | Fellow of Carnegie Institution of Washington, USA |
| 1973 | Visiting Fellow and Associate, National Institute of Child Health and Human Development, NIH, USA |
| 1974 | Assistant Professor, the University of Tokyo |
| 1979 | Professor, Faculty of Medicine, Osaka University |
| 1984 | Professor, Faculty of Medicine, Kyoto University |
| 1988 | Director, Center for Molecular Biology and Genetics, Kyoto University |
| 1996 | Dean, Faculty of Medicine, Kyoto University |
| 2004 | Dean, Graduate School of Medicine, Kyoto University |
| 2004 | Director, Japan Society for the Promotion of Science |
| 2005 | Professor Emeritus, Kyoto University |
| 2006 | Professor, Graduate School of Medicine, Kyoto University |
| 2006 | Executive Member, Council for Science and Technology Policy, Cabinet Office, Government of Japan |
| 2012 | Chairman, Board of Directors, Shizuoka Prefectural University Corporation |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1985 | The Baelz Prize, Boehringer Ingelheim, Germany |
| 1996 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 2000 | Persons of Cultural Merit, Japan |
| 2001 | Foreign Associate, National Academy of Sciences, USA |
| 2003 | Members of the Leopoldina, the German National Academy of Sciences, Germany |
| 2013 | Order of Culture, Japan |

# AAPS Research Achievement Award in Pharmaceutics and Drug Delivery 2008

***American Association of Pharmaceutical Scientists***


*Pharmacology, Pharmaceutical Science*

**Awarded for**

explaining the mechanism of drug transport in the human body

## Ken-ichi Inui [ *1947-* ]

Ph.D. in Pharmaceutical Sciences
President, Kyoto Pharmaceutical University
Professor Emeritus, Kyoto University

Ken-ichi Inui

### Achievements

Professor Ken-ichi Inui explained how a drug is transported across biomembranes in the human body. He has conducted excellent research on drug transporters in the small intestine, kidney and liver to clarify the molecular mechanisms of drug absorption and disposition, and its clinical application, so-called "From Bench To Bedside". The landmark achievement of his research was to overcome interindividual variation in pharmacokinetics and establish personalized pharmacotherapy, focusing on functional and molecular information on transporters.

### Profile

Ken-ichi Inui was appointed Professor and Director of the Department of Pharmacy, Kyoto University Hospital, Graduate School of Medicine, and Professor of the Department of Clinical Pharmacy, Graduate School of Pharmaceutical Sciences, Kyoto University. Throughout his career as a professor of clinical pharmacy, he educated many pharmacist-scientists.

**Timeline**

| | |
|---|---|
| 1972 | Assistant Professor, School of Medicine, Hiroshima University |
| 1977 | Received Ph.D. from Kyoto University |
| 1978 | Research Fellow, Harvard University |
| 1979 | Assistant Professor, Kyoto University Hospital |
| 1984 | Lector, Kyoto University Hospital |
| 1987 | Associate Professor, Kyoto University Hospital |
| 1990 | Professor, Tokyo Medical and Dental University |
| 1994 | Professor, Kyoto University Hospital |
| 2010 | Retired from Kyoto University and entitled Professor Emeritus |
| 2010 | President, Kyoto Pharmaceutical University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1996 | Fellow, American Association of Pharmaceutical Scientists (AAPS), USA |

# Keio Medical Science Prize 2005

**Keio University Medical Science Fund**

Chemical Biology

**Awarded for**

the development of high-resolution electron cryo-microscopy for the determination of membrane protein structures

## Yoshinori Fujiyoshi [ *1948 -* ]

Doctor of Science
Professor, Nagoya University
Emeritus Professor, Kyoto University

Yoshinori Fujiyoshi

## Achievements

Resolving the three-dimensional structure of membrane proteins was one of the biggest challenges in understanding cellular dynamic functions. Professor Fujiyoshi observed membrane proteins using the original electron microscope with cryopreservation system. Subsequently, he succeeded in resolving the structures of proteins, such as Aquaporine-0, -1, -4, Connexin 26, nicotinic acetylcholine receptor, voltage-sensitive sodium channel, and $IP_3$ receptor. At present, Fujiyoshi-type electron microscopes dominate the methods for membrane protein analysis at higher resolution.

## Profile

Yoshinori Fujiyoshi has strived to understand the functions of the brain and other nerve systems based on structural and functional information of key molecules. With his unique approaches, he has elucidated the functions of more membrane proteins than listed above. His method for understanding physiological functions from protein structures lent new insight for biologists. In this field, currently known as "structural physiology," Fujiyoshi is recognized as the originator.

**Timeline**

| | |
|---|---|
| 1982 | Received Doctor of Science from Kyoto University |
| 1985 | Associate Professor, Kyoto University |
| 1987 | Senior Research Scientist, Protein Engineering Research Institute, Japan |
| 1988 | Research Director, Protein Engineering Research Institute, Japan |
| 1994 | Research Director, Matsushita Electronic Industrial Co., Ltd. |
| 1996 | Professor, Kyoto University (-2013) |
| 1998 | Multisome Team Leader, RIKEN Harima Institute (held concurrently) |
| 1999 | Structural Genomics Team Leader, Japan Biological Information Research Centre (held concurrently) |
| 2003 | Group Leader, RIKEN Harima Institute (held concurrently) |
| 2012 | Director and Professor, Cellular and Structural Physiology Institute, Nagoya University |
| 2013 | Emeritus Professor, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2006 | Medal with Purple Ribbon, Japan |
| 2008 | Japan Academy Prize, the Japan Academy, Japan |

# Keio Medical Science Prize 2009

***Keio University Medical Science Fund***

Biochemistry

**Awarded for**

the discovery and clinical application of ghrelin and other novel bioactive peptides

## Kenji Kangawa [ *1948 -* ]

Doctor of Science
Director General, National Cerebral and Cardiovascular Center Research Institute
Professor, Kyoto University

Kenji Kangawa

## Achievements

Professor Kangawa and his colleagues applied their proprietary method for the purification of an endogenous ligand for the growth hormone secretagogue receptor from gastric tissue and then determined its structure. The identified ligand was named ghrelin and demonstrated a potent appetite-stimulating effect in addition to its growth hormone secretagogue activity. A ghrelin-based drug is currently in the clinical trial stage as a therapeutic agent for anorexia nervosa (cibophobia). Dr. Kangawa's team identified other important molecules, including atrial natriuretic peptide (ANP), brain natriuretic peptide (BNP), and adrenomedullin. ANP and BNP are currently used as therapeutic and diagnostic agents in clinical settings.

## Profile

Kenji Kangawa started his career as a biochemist in hormone identification when he was under the supervision of Professor Hisayuki Matsuo in Osaka University, who developed a micro-sequencing method for peptides and identified luteinizing hormone-releasing hormone. Professor Kangawa further developed the technology for peptide hormone identification at Miyazaki Medical College. Subsequently, he completed further achievements in the discovery of a number of peptide hormones at the National Cerebral and Cardiovascular Center (NCVC) Research Institute. In addition to these efforts, he actively plays a leading role in the translational research of the aforementioned bioactive peptides at NCVC and Kyoto University.

**Timeline**

| | |
|---|---|
| 1976 | Received Doctor of Science from Osaka University |
| 1977 | Assistant Professor, Miyazaki Medical College |
| 1990 | Associate Professor, Miyazaki Medical College |
| 1993 | Director, Department of Biochemistry, National Cerebral and Cardiovascular Center (NCVC) Research Institute, Japan |
| 1996 | Professor, Kyoto University (held concurrently, -present) |
| 2007 | Director General, NCVC Research Institute, Japan |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2002 | International Okamoto Award, Japan Vascular Disease Research Foundation, Japan |
| 2005 | Asia and Oceania Medal, The Society for Endocrinology, UK |
| 2006 | Wertheimer Award, The International Association for the Study of Obesity |
| 2008 | Japan Academy Prize, the Japan Academy, Japan |

# Emil von Behring-Preis 1994

**Philipps-Universität Marburg**

Molecular Biology

**Awarded for**

contribution to the research of apoptosis and its molecular mechanism

## Shigekazu Nagata [ 1949 - ]

Doctor of Science
Member of the Japan Academy
Professor, Kyoto University
Professor Emeritus, Osaka University

Shigekazu Nagata

## Achievements

Professor Nagata has dedicated his career to the research on molecular biology, especially in resolving the mechanism of programmed cell death or apoptosis. He identified cytokines and receptors, such as Fas and Fas ligand, which cause cell death during an animal's ontogenesis or cellular metabolism. He also discovered a process in which certain types of proteases and DNases contribute to apoptotic cell death and macrophages recognize those cells with phosphatidylserine on the surface. Furthermore, he found that a malfunction in apoptotic processes causes autoimmune disease and several other diseases. Professor Nagata's unceasing studies of apoptosis continue to influence research from basic to clinical practice.

## Profile

Professor Nagata received his doctor degree from Tokyo University and then trained as a postdoctoral fellow at the University of Zürich. As a member of Charles Weissmann's laboratory, he succeeded in the first cloning and expression of the interferon gene. His interest in interferon's function motivated him to start his study of apoptosis. His continuous efforts with collaborators worldwide have yielded significant scientific results at Osaka Bioscience Institute, Osaka University, and Kyoto University.

**Timeline**

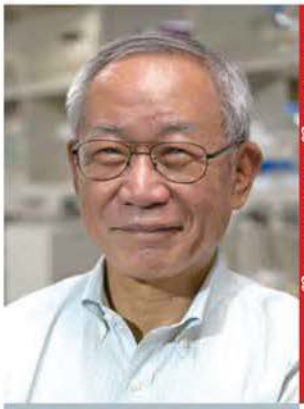
| | |
|---|---|
| 1977 | Received Doctor of Science from the University of Tokyo |
| 1977 | Research Associate, Institute of Medical Science, the University of Tokyo |
| 1977 | Postdoctoral Fellow, Institute of Molecular Biology, University of Zürich |
| 1982 | Assistant Professor, the University of Tokyo |
| 1987 | Head, Department of Molecular Biology, Osaka Bioscience Institute, Japan |
| 1995 | Professor, Graduate School of Medicine, Osaka University |
| 2002 | Professor, Graduate School of Frontier Bioscience, Osaka University (-2007) |
| 2007 | Entitled Professor Emeritus, Osaka University |
| 2007 | Professor, Graduate School of Medicine, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1997 | Le Prix Antoine Lacassagne, French Cancer League, France |
| 1998 | The Princess Takamatsu Cancer Research Fund Prizes, The Princess Takamatsu Cancer Research Fund, Japan |
| 2000 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 2001 | Person of Cultural Merit, Japan |
| 2012 | Honorary Doctorate, University of Zürich, Switzerland |
| 2012 | Debrecen Award, Debrecen University, Hungary |
| 2013 | Keio Medical Science Prize, Keio University Medical Science Fund, Japan |

# University College Dublin Ulysses Medal 2008

***University College Dublin***



*Pharmacology and Cell Biology*

**Awarded for**

his scientific research and discoveries in the area of cell biology, which have resulted in over 370 peer-reviewed publications and significant research awards

## Shuh Narumiya [ *1949 -* ]

M.D. and Ph.D. in Biochemistry
Professor, Kyoto University

Shuh Narumiya

## Achievements

Professor Narumiya identified a family of eight types of receptors for prostaglandins and clarified their physiological actions and action mechanisms. He also discovered signal transduction of the small GTPase Rho and clarified how actin is organized in the cell and the body.

## Profile

Born in Shiga, Japan, Shuh Narumiya enjoyed history and literature as a child. After he obtained his degrees in M.D. and Ph.D. at Kyoto University School of Medicine, he studied pharmacology at Wellcome Research Laboratories in England under Sir John Vane. He has more than 400 scholarly publications in pharmacology, biochemistry and cell biology and has contributed to both basic and clinical medicine. As the Dean, he significantly improved medical education and advanced research activities at University and in Japan.

**Timeline**

| | |
|---|---|
| 1973 | Graduated from Kyoto University Faculty of Medicine, M.D. |
| 1979 | Received Ph.D. in Medical Sciences from Kyoto University |
| 1979 | Postdoctoral Fellow, the Wellcome Research Laboratories, England |
| 1981 | Assistant Professor, Kyoto University |
| 1987 | Associate Professor, Kyoto University |
| 1992 | Professor, Kyoto University |
| 2004 | Dean, Faculty of Medicine, Kyoto University (-2007) |
| 2007 | Director, the Center of Innovation in Immunoregulative Technology and Therapeutics, Kyoto University |
| 2010 | Director, Medical Innovation Center, Kyoto University school of Medicine |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1999 | Dolan B. Pritchett Memorial Lecturer, University of Pennsylvania, USA |
| 2000 | Giovanni Lorenzini Gold Medal, Italy |
| 2005 | Medal with Purple Ribbon, Japan |
| 2006 | Imperial Prize and the Japan Academy Prize, the Japan Academy, Japan |
| 2009 | Inflammation Research Lifetime Achievement Award, the International Association of Inflammation Societies |

# AAPS Research Achievement Award in Pharmaceutics and Drug Delivery 2007

***American Association of Pharmaceutical Scientists***

Pharmaceutical Science

**Awarded for**

development and evaluation of novel drug delivery systems for proteins and genes

## Mitsuru Hashida [ *1951 -* ]

Ph.D. in Pharmaceutical Science
Professor, Kyoto University

Mitsuru Hashida

### Achievements

Professor Hashida has been a major player in the field of drug delivery for more than 35 years. His research on the delivery of DNA and proteins into cells using liposomes and analysis of oral and transdermal drug absorption has led to over 500 published scientific articles in which he has been either the main author or co-author.

### Profile

Mitsuru Hashida received his Ph.D. from Kyoto University in 1979 and went on to become a faculty member in 1980. He has spent most of his academic life at Kyoto University, where he has served time as the Dean of the Faculty of Pharmacy. He has also been the Chairman of the Board of Pharmaceutical Sciences in the International Pharmaceutical Federation (FIP), and a member of the Science Council of Japan. Currently, he is a Professor of the Graduate School of Pharmaceutical Sciences and Institute for Integrated Cell-Material Sciences (WPI-iCeMS) at Kyoto University.

**Timeline**

| | |
|---|---|
| 1979 | Postdoctoral Research Associate, the University of Kansas |
| 1980 | Assistant Professor, Kyoto University |
| 1983 | Associate Professor, Kyoto University |
| 1992 | Professor, Kyoto University (-present) |
| 2002 | Dean, Graduate School of Pharmaceutical Sciences, Kyoto University (-2006) |
| 2008 | Principal Investigator, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University (held concurrently) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1998 | FIP Distinguished Scientist Award, International Pharmaceutical Federation |

# Keio Medical Science Prize 2008

**Keio University Medical Science Fund**

Immunology

**Awarded for**

the discovery of regulatory T cells and their roles in immunological diseases

## Shimon Sakaguchi [ 1951 - ]

M.D. and Ph.D. in Medical Science
Professor, Kyoto University
Adjunct Professor, WPI Immunology Frontier Research Center, Osaka University

Shimon Sakaguchi

### Achievements

Professor Sakaguchi discovered regulatory T cells, a population of lymphocytes, which control a variety of physiological and pathological immune responses, and has elucidated the molecular and cellular basis of their development and function for the treatment and prevention of immunological diseases in humans.

### Profile

Shimon Sakaguchi is an immunologist investigating how the immune system protects the body from invading microbes while avoiding abnormal or excessive immune responses, such as autoimmunity and allergy, harmful to the host. After graduating from Kyoto University School of Medicine, he conducted his research at Johns Hopkins University, Stanford University, and Scripps Research Institute in the USA. After returning to Japan, he continued his study at several research institutes and universities. He enjoys visiting various countries for lecturing, and enjoys visiting art museums in his spare time during his travels.

**Timeline**

| | |
|---|---|
| 1976 | Resident, Kyoto University Medical School and Hospital |
| 1978 | Visiting Investigator, Aichi Cancer Center Research Institute |
| 1981 | Senior Research Fellow, Kyoto University Medical School |
| 1981 | Joint Appointment, the Blood Transfusion Service, Kyoto University Hospital |
| 1983 | Postdoctoral Fellow, Johns Hopkins University |
| 1986 | Lucille P. Markey Scholar |
| 1987 | Visiting Scientist, Stanford University Medical Center |
| 1989 | Assistant Professor, Scripps Research Institute |
| 1992 | Investigator, Science and Technology Agency of Japan |
| 1994 | Head, Department of Immunopathology, Tokyo Metropolitan Institute of Gerontology |
| 1999 | Professor and Chair, Institute for Frontier Medical Sciences, Kyoto University |
| 2007 | Director, Institute for Frontier Medical Sciences, Kyoto University (-present) |
| 2007 | Adjunct Professor, WPI Immunology Frontier Research Center, Osaka University (held concurrently) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2004 | William B. Coley Award, Cancer Research Institute, USA |
| 2012 | Foreign Associate, the National Academy of Sciences, USA |

# Canada Gairdner International Award 2009

***The Gairdner Foundation***

*Molecular Biology*

**Awarded for**

the dissection and elucidation of a key pathway in the unfolded protein response which regulates protein folding in the cell

## Kazutoshi Mori [ *1958 -* ]

Ph.D. in Pharmaceutical Sciences
Professor, Kyoto University

Kazutoshi Mori

## Achievements

The unfolding or misfolding of proteins constitutes a fundamental threat to all living cells. Professor Mori has elucidated the molecular mechanisms through which cells adjust their capacity for protein folding and quality control according to the need in the endoplasmic reticulum (ER), where all secretory and transmembrane proteins gain correct tertiary and quaternary structures. The mechanism is now known as "the unfolded protein response or ER stress response," to which Professor Mori's contribution from its discovery is broadly appreciated.

## Profile

Kazutoshi Mori graduated from the Graduate School of Pharmaceutical Sciences of Kyoto University. He spent his early days as a researcher at University of Texas Southwestern Medical Center at Dallas in the USA, and began working on the unfolded protein response. He returned to Kyoto University as Associate Professor at the age of 40 years and became Professor at the age of 45 years. His achievements are evidenced by a number of international and domestic awards, including the Wiley Prize.

**Timeline**

| | |
|---|---|
| 1985 | Instructor, Gifu Pharmaceutical University |
| 1989 | Postdoctoral Fellow, University of Texas Southwestern Medical Center at Dallas |
| 1993 | Deputy Research Manager, HSP Research Institute |
| 1996 | Research Manager, HSP Research Institute |
| 1999 | Associate Professor, Graduate School of Biostudies, Kyoto University |
| 2003 | Professor, Graduate School of Science, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2005 | Wiley Prize in Biomedical Science, the Wiley Foundation |
| 2010 | Medal with Purple Ribbon, Japan |

Chapter

# 6

## Huxley Memorial Medal and Lecture

*"It is awarded annually, by ballot of the Council, to a scientist, British or foreign, distinguished in any field of anthropological research in the widest sense." (The Royal Anthropological Institute site: www.theral.org.uk)*

## Class III Commander of the Most Exalted Order of the White Elephant

*"The Most Exalted Order of the White Elephant" is "The Order was established in 1861 by King Rama IV. Originally, there was no sash but later added onto by the decree of King Rama V. This Order consists of eight classes" (The Secretariat of the Cabinet, Government of Thai site: www.cabinet.thaigov.go.th/eng/)*

## L.S.B. Leakey Foundation Prize

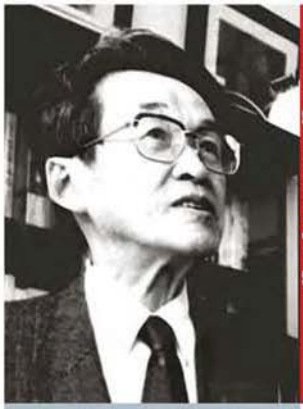
*"This prize is awarded to prominent anthropologists for their contributions to multidisciplinary studies on human origins." "The Leakey Foundation will award 2008 L.S.B. Leakey Foundation Prize for Multidisciplinary Research on Ape and Human Evolution to two distinguished chimpanzee research pioneers" (Mahale Wildlife Conservation Society site: mahale.main.jp)*

## Prix du Rayonnement de langue et de littérature françaises

*"Prix annuels, créés en 1960. Destinés à des personnalités françaises ou étrangères ayant rendu à la langue et aux lettres des services particuliers." (Académie française site: www.academie-francaise.fr)*

# Huxley Memorial Medal and Lecture 1984

***The Royal Anthropological Institute***



*Primatology and Anthropology*

**Awarded for**
his studies on the ecology and social rules of primates

## Junichiro Itani [ *1926 - 2001* ]

Doctor of Science
Professor Emeritus, Kyoto University

Junichiro Itani

## Achievements

Professor Itani first carried out long-term observations of wild Japanese macaques in Japan, and then expanded the scope of his research to include chimpanzees and gorillas in Africa. His original research revealed the rules in and organizational structures of monkey groups as well as their tendency for cultural patrimony. He became the first Japanese to receive the Huxley Award in Anthropology from the Royal Anthropological Institute in London, often known as the Nobel Prize in anthropology.

## Profile

Junichiro Itani joined the Faculty of Science at Kyoto University in 1981. Before taking this position, he studied Japanese macaques in Oita Prefecture, where he found ways to feed them and learned to recognize individual monkeys. In his later career, he founded the Primate Research Institute and the Center for African Area Studies, which conduct comprehensive research on both primates and humans.

**Timeline**

| | |
|---|---|
| 1952 | Graduated from Kyoto University |
| 1956 | Research Fellow, Japan Monkey Center |
| 1962 | Received Doctor of Science from Kyoto University |
| 1961 | Associate Professor, Kyoto University |
| 1981 | Professor, Kyoto University |
| 1985 | Director, the Center for African Area Studies, Kyoto University |
| 1990 | Retired from Kyoto University and entitled Professor Emeritus |
| 1990 | Professor, Kobe Gakuin University (-1999) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1992 | Medal with Purple Ribbon, Japan |
| 1997 | The Third Order of the Sacred Treasure, Japan |

# Class III Commander of the Most Exalted Order of the White Elephant 1987

***Thai Government***

History and Southeast Asian Studies

**Awarded for**

pioneering work of Southeast Asian study, especially, interdisciplinary study of Thailand including Theravada Buddhism

## Yoneo Ishii [ *1929 - 2010* ]

Doctor of Law

Professor Emeritus, Kanda University of International Studies and Kyoto University

Yoneo Ishii

## Achievements

Professor Ishii was one of the leading scholars of Southeast Asian studies in Japan. In particular, he was known for his historical studies on Theravada Buddhism, the results of which were included in his book *Sangha, "State and Society: Thai Buddhism in History."* The book was evaluated as a pioneering work in religious and social studies on the relationships between Buddhism and successive kings in Thailand. In later years, he also studied ancient codes and conducted comparative research on the history of law.

## Profile

Yoneo Ishii actively pursued his academic interests both at home and abroad. He became a faculty member at the Center for Southeast Asian Studies in 1965 after serving as a diplomat in the Ministry of Foreign Affairs. He also served as president of the International Association of Historians of Asia.

**Timeline**

| | |
|---|---|
| 1953 | Entered Tokyo University of Foreign Studies to study Siamese |
| 1955 | Worked as a diplomat at the Ministry of Foreign Affairs of Japan |
| 1957 | Studied at Chulalongkorn University, Thailand |
| 1965 | Associate Professor, Center for Southeast Asian Studies, Kyoto University |
| 1968 | Professor, Center for Southeast Asian Studies, Kyoto University |
| 1981 | Received Doctor of Law from Kyoto University |
| 1985 | Director, Center for Southeast Asian Studies, Kyoto University |
| 1990 | Professor, Sophia University |
| 1993 | Director, the Institute of Asian Cultures, Sophia University |
| 1999 | President, Kanda University of International Studies |
| 1999 | Director, National Institute for the Humanities |
| 1999 | Director, Japan Center for Asian Historical Records at National Archives of Japan |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1995 | Medal with Purple Ribbon, Japan |
| 2000 | Person of Cultural Merit, Japan |
| 2007 | Honorary Ph.D. from Chulalongkorn University, Thailand |

# L.S.B. Leakey Foundation Prize 2008

***The Leakey Foundation***

Photo: Japan Monkey Centre

*Primatology and Anthropology*

**Awarded for**

his pioneering research on social structures and behavioral patterns of chimpanzees

## Toshisada Nishida [ *1941 - 2011* ]

Doctor of Science

Professor Emeritus, Kyoto University

Toshisada Nishida

### Achievements

Professor Nishida was known as the leading researcher on Tanzanian chimpanzees in the Mahale Mountains. He established a research site in the area to carry out long-term research on the social structures, behavioral ecology, and other aspects of wild chimpanzees. His persistence in fieldwork led to important discoveries, which include the identification of a definite social structure he called "unit group" (or community) and determination of a female transfer system among chimpanzee unit groups. He also received the 2008 Lifetime Achievement Award of the International Primatological Society, in which he also served as president from 1996 to 2000.

### Profile

Toshisada Nishida was one of the trailblazers of Japanese primatology. When he was a doctoral student, he joined the Kyoto University's Ape Expedition to Africa organized by two other primatologists, Kinji Imanishi and Junichiro Itani (see p.67). As a professor at Kyoto University Graduate School of Science, he trained a generation of Japanese students while serving as the president of Primate Society of Japan from 2001 to 2004.

**Timeline**

| | |
|---|---|
| 1969 | Received Doctor of Science from Kyoto University by wild chimpanzee study |
| 1969 | Assistant Professor, the University of Tokyo |
| 1974 | Lecturer, the University of Tokyo |
| 1981 | Associate Professor, the University of Tokyo |
| 1988 | Professor, Kyoto University |
| 1996 | President, International Primatological Society (-2000) |
| 2004 | Retired from Kyoto University and became Professor Emeritus |
| 2004 | Director, Japan Monkey Centre |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2008 | Lifetime Achievement Award, International Primatological Society |

# Prix du Rayonnement de langue et de littérature françaises 2010

***Académie française***

Literature

**Awarded for**

his life-long study of a French novelist, Marcel Proust, and his book, "*Proust et l'art pictural (Proust and Pictorial Art),*" published in 2010

## Kazuyoshi Yoshikawa [ *1948 -* ]

Ph.D. in Literature
Professor Emeritus, Kyoto University
Professor Emeritus, Tokyo Metropolitan University

Kazuyoshi Yoshikawa

## Achievements

Professor Yoshikawa received the 2010 Prix du Rayonnement de la langue et de la littérature françaises of the Prix de l'Académie Française, an honorary prize awarded to those who made significant contributions to the French language and literature through literary work written in French. Professor Yoshikawa is the first Japanese recipient of the prize. His book, "*Proust et l'art pictural*," is a creative and comprehensive investigation of meanings and roles of European paintings and painters presented in Proust's novel, "*In Search of Lost Time*." This book also received Prix littéraire Cabourg-Balbec (2011), and Imperial Prize and Japan Academy Prize (2012).

## Profile

Kazuyoshi Yoshikawa is an international authority on research on Marcel Proust, one of the most influential French novelists in the 20th century. For the past two decades, he has studied how European paintings in "*In Search of Lost Time*" play key roles in the work's construction. He also received the Officier grade of the Ordre des Palmes Académiques for this scholarly work as well as for his long-term contribution to cultural and academic exchanges between Japan and France. Professor Yoshikawa also served as the chairperson of La Société japonaise de langue et littérature françaises between 2009 and 2013.

**Timeline**

| | |
|---|---|
| 1970 | Graduated from the University of Tokyo |
| 1977 | Graduated from the University of Tokyo, Graduate School |
| 1977 | Received Ph.D. in Literature from Paris Sorbonne University |
| 1977 | Assistant, the University of Tokyo |
| 1981 | Associate Professor, Tokyo Women's Christian University |
| 1988 | Associate Professor, Tokyo Metropolitan University |
| 1993 | Professor, Tokyo Metropolitan University |
| 2006 | Professor Emeritus, Tokyo Metropolitan University |
| 2007 | Professor, Kyoto University (-2013) |
| 2009 | President, the Japanese Society of French Language and Literature (-2013) |
| 2013 | Professor Emeritus, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2010 | Officier des Palmes Académiques, France |
| 2011 | Madeleine d'Or for *Proust et l'art pictural*, Le Cercle Littéraire Proustien de Cabourg-Balbec, France |
| 2012 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |

# AWARD HISTORY

## 2008-2013

### 2008

**Toshihide Maskawa**
Nobel Prize in Physics
**Makoto Kobayashi**
Nobel Prize in Physics
**Hiroshi Matsumoto**
Booker Gold Medal
**Tamio Hayashi**
Arthur C. Cope Scholar Award
**Hirosi Ooguri**
Leonard Eisenbud Prize
**Ken-ichi Inui**
AAPS Research Achievement Award
in Pharmaceutics and Drug Delivery
**Shuh Narumiya**
University College Dublin Ulysses Medal
**Shimon Sakaguchi**
Keio Medical Science Prize
**Toshisada Nishida**
L.S.B. Leakey Foundation Prize
**Keiji Morokuma**
Imperial Prize and Japan Academy Prize

### 2009

**Kenji Kangawa**
Keio Medical Science Prize
**Kazutoshi Mori**
Canada Gairdner
International Award
**Yorio Hinuma**
Order of Culture, Japan
**Tohru Eguchi**
Imperial Prize and Japan Academy Prize

### 2010

**Susumu Kitagawa**
Thomson Reuters Citation Laureates
**Kazuyoshi Yoshikawa**
Prix du Rayonnement de langue
et de littérature françaises

### 2011

**Keiji Maruoka**
Arthur C. Cope Scholar Award
**Mitsuhiro Yanagida**
Order of Culture, Japan

### 2012

**Shinya Yamanaka**
Nobel Prize in Physiology or Medicine
**Denis Le Bihan**
Honda Prize
**Mitsuo Sawamoto**
Macro Group UK Medal
for Outstanding Achievement in Polymer Science
**Tasuku Honjo**
Robert-Koch Award
**Yasuyuki Yamada**
Order of Culture, Japan

### 2013

**Masatoshi Nei**
Kyoto Prize, Basic Sciences
**Tetsuji Miwa**
Dannie Heineman Prize
for Mathematical Physics

Chapter

7

VII

## Order of Culture, Japan

*"This order is awarded to individuals who have made outstanding contributions in developing the Japanese culture." "Established in 1937, this medal features the five petals of a mandarin orange blossom with three magadama (comet-shaped stones) swirled in the center. The attachment features a mandarin orange and leaf." "the mandarin orange tree is used in the Order of Culture because this symbolism connects deeply with the timelessness of culture." (Cabinet Office, Government of Japan site: www.cao.go.jp/index-e.html)*

# List of the Awardees of the Order of Culture, Japan at Kyoto University

The following is a list of Kyoto University researchers who have received the Order of Culture since 1949. Only the eight Laureates shown in bold are profiled in this chapter due to limitations of space. The other awardees will be introduced in a revised edition.

| Year | Laureate | Title at the time of receiving the Award | Award Field |
|---|---|---|---|
| 2013 | Tasuku Honjo (see p. 57) | Professor Emeritus and Visiting Professor of Kyoto University | Biochemistry and Molecular Immunology |
| 2012 | **Yasuyuki Yamada**<br>Shinya Yamanaka (see p. 16) | Professor Emeritus of Kyoto University<br>Professor, The Center for iPS Cell Research and Application | Plant Cell and Molecular Biology, Plant Biotechnology<br>Medical Physiology |
| 2011 | **Mitsuhiro Yanagida** | Professor Emeritus of Kyoto University | Molecular Biology |
| 2009 | **Yorio Hinuma** | Professor Emeritus of Kyoto University | Virology |
| 2008 | Toshihide Maskawa (see p. 14)<br>Makoto Kobayashi (see p. 15)<br>Kiyosi Itô (see p. 19) | Professor Emeritus of Kyoto University<br>Honorary Professor Emeritus, High Energy Accelerator Research Organization<br>Professor Emeritus of Kyoto University | Theoretical Physics<br>Theoretical Physics<br>Mathematics |
| 2007 | Tokindo S. Okada (see p. 54) | Professor Emeritus of Kyoto University | Developmental Biology |
| 2005 | **Toshio Sawada** | Professor Emeritus of Kyoto University | Agricultural Engineering |
| 2003 | **Kazuhiko Nishijima** | Professor Emeritus of Kyoto University | Particle Physics |
| 2000 | Ryoji Noyori (see p. 13) | Professor, Nagoya University | Organic Chemistry |
| 1994 | **Hisateru Mitsuda**<br>**Tadao Umesada** | Professor Emeritus of Kyoto University<br>Former Professor, Institute for Research in Humanities | Nutritional Chemistry<br>Ethnology |
| 1993 | **Kenichiro Osumi** | Professor Emeritus of Kyoto University | Commerce Law |
| 1987 | Takeo Kuwabara | Professor Emeritus of Kyoto University | Western Culture |
| 1986 | Chushiro Hayashi (see p. 27) | Professor Emeritus of Kyoto University | Astrophysics |
| 1984 | Shigeki Kaizuka<br>Susumu Tonegawa (see p. 12) | Professor Emeritus of Kyoto University<br>Professor, MIT | Historical Science on China<br>Molecular Biology |
| 1981 | Kenichi Fukui (see p. 11) | Professor, Faculty of Engineering | Chemistry |
| 1979 | Kinji Imanishi | Professor Emeritus of Kyoto University | Primatology |
| 1978 | Michitaro Tanaka | Professor Emeritus of Kyoto University | Philosophy and Classics |
| 1977 | Ichiro Sakurada | Professor Emeritus of Kyoto University | Applied Chemistry, Polymer Chemistry |
| 1975 | Heisuke Hironaka (see p. 22) | Professor Emeritus of Kyoto University | Mathematics |
| 1974 | Kimishige Ishizaka (see p. 29) | Professor, The Johns Hopkins University and Kyoto University | Immunology |
| 1972 | Osamu Hayaishi (see p. 20) | Professor, Faculty of Medicine | Biochemistry |
| 1962 | Yoshinari Kuwada | Professor Emeritus of Kyoto University | Plant Cytology |
| 1961 | Torao Suzuki | Professor Emeritus of Kyoto University | Chinese Literature |
| 1956 | Izuru Shinmura | Professor Emeritus of Kyoto University | Linguistics |
| 1953 | Toru Haneda | Professor Emeritus of Kyoto University | Oriental History |
| 1952 | Soichiro Sasaki<br>Sin-itiro Tomonaga (see p. 10) | Professor Emeritus of Kyoto University<br>Professor, Tokyo University of Education | Constitutional and Administrative Law<br>Theoretical Physics |
| 1950 | Hajime Tanabe | Professor Emeritus of Kyoto University | Philosophy |

# Order of Culture, Japan 1993

***Japanese Government***

Photo: Hogakuronsyu Vol.52 (1962) 2-4

*Commercial Law*

**Awarded for**

his excellent academic and judicial work in the field of commercial laws

## Kenichiro Osumi [ *1904 - 1998* ]

Doctor of Law

Professor Emeritus, Kyoto University

Kenichiro Osumi

## Achievements

Professor Osumi was renowned for his pioneering studies on commercial laws or, more specifically, corporate laws in Japan. He was one of the first legal scholars who introduced the principle of "piercing the corporate veil" to Japan and advanced theoretical debates on the rights and duties of a corporation. After retiring from Kyoto University in 1966, he became a judge of the Supreme Court and set many new precedents in the area of commercial laws.

## Profile

Kenichiro Osumi joined the School of Law at Kyoto Imperial University in 1928. He was known for actively fostering young legal scholars and jurists during his time in the academe. In 1995, the Osumi Kenichiro Prize was established from his donation. This annual award recognizes excellent academic works on commercial laws.

**Timeline**

| | |
|---|---|
| 1928 | Graduated from Kyoto Imperial University Faculty of Law |
| 1928 | Assistant Professor, Kyoto Imperial University |
| 1930 | Associate Professor, Kyoto Imperial University |
| 1933 | Professor, Ritsumeikan University |
| 1934 | Associate Professor, Kyoto Imperial University |
| 1938 | Professor, Kyoto Imperial University |
| 1953 | Received Doctor of Law from Kyoto University |
| 1966 | Retired from Kyoto University and entitled Professor Emeritus |
| 1966 | Judge of the Supreme Court, Japan |
| 1974 | Professor, Kobe Gakuin University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1973 | Grand Cordon of the Order of the Sacred Treasure, Japan |
| 1977 | Japan Academy Prize, the Japan Academy, Japan |

# Order of Culture, Japan 1994

**Japanese Government**

Agricultural and Food Chemistry

**Awarded for**

his contribution to developing vitamin-enriched rice and related studies in nutrition

## Hisateru Mitsuda [ 1914 - 2006 ]

Doctor of Agriculture
Professor Emeritus, Kyoto University

Hisateru Mitsuda

## Achievements

Professor Mitsuda explained how vitamins are synthesized in a living body for respiration and then invented various diets for curing poverty-caused vitamin deficiency and malnutrition. These products have contributed to reducing the number of patients with vitamin deficiencies, such as beriberi, in Japan. He also adopted findings from research on the hibernation process of cold-blooded animals for the preservation of grains and beans under carbon dioxide-rich and cold atmosphere.

## Profile

An alumnus of Kyoto University, Hisateru Mitsuda's lifelong research interest was on vitamins. As a scientist of vitamins, he recognized the importance of vitamin supplementation in human daily diet and developed vitamin-enriched rice. This product has been sold since 1951 and remains popular in the Japanese market. According to Professor Mitsuda, scientists must give something back to society to compensate the taxpayers, a philosophy that represents his research style of balancing basic and applied sciences.

**Timeline**

| | |
|---|---|
| 1944 | Graduated from Kyoto Imperial University Faculty of Agriculture |
| 1944 | Associate Professor, Kyoto University |
| 1952 | Professor, Institute for Chemical Research, Kyoto University |
| 1955 | Professor, Faculty of Agriculture, Kyoto University |
| 1978 | Professor Emeritus, Kyoto University |
| 1978 | President, Koshien University (-1983) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1971 | Babcock-Hart Award, Institute of Food Technologies, Institute of Food Technologies, USA |
| 1974 | Bor S. Luh International Award, Institute of Food Technologies, USA |
| 1980 | Medal with Purple Ribbon, Japan |
| 1981 | Award for the Advancement of Application of Agricultural and Food Chemistry, American Chemical Society, USA |
| 1981 | Japan Academy Prize, the Japan Academy, Japan |
| 1989 | Person of Cultural Merit, Japan |

# Order of Culture, Japan 1994

***Japanese Government***

Photo: The Sankei Shimbun

*Ethnology, Comparative Study of Civilizations*

**Awarded for**
his contribution to the development of ethnology in Japan

## Tadao Umesao [ *1920 - 2010* ]

Doctor of Science
Professor Emeritus, Kyoto University,
Graduate University for Advanced Studies and
National Museum of Ethnology, Japan

Tadao Umesao

## Achievements

Professor Umesao was known for his unique social theories on civilizations based on his ethnological surveys in Asia, Africa and Europe. One of his most influential books, "*An Ecological View of History: Japanese Civilization in the World Context*," explained the development of West European and Japanese civilizations progressed almost in parallel by applying the concept of "succession". An intellectual giant, Professor Umesao had an accomplished career that crossed the boundaries of zoology and ethnology. He wrote dozens of books in total, some of which became long-sellers among the public. His collected works (22 volumes and supplement) were published in 1989-1994 by Chuokoronsha Inc..

## Profile

Tadao Umesao was initially trained as an animal ecologist at Kyoto University, where he participated in a series of academic expeditions organized by famous zoologist Kinji Imanishi. He joined the Institute for Research in Humanities in 1965 and later became the founding director-general of the National Museum of Ethnology in Osaka.

**Timeline**

| | |
|---|---|
| 1943 | Graduated from Kyoto Imperial University School of Science |
| 1949 | Associate Professor, Osaka City University |
| 1961 | Received Doctor of Science from Kyoto University |
| 1963 | Academic Research Fellow of Africa, Kyoto University |
| 1965 | Assistant Professor, Kyoto University |
| 1969 | Professor, Kyoto University |
| 1974 | Founding Director-General, National Museum of Ethnology, Japan |
| 1988 | Honorary Member, Institute for Research in Humanities, Kyoto University |
| 1993 | Special-Advisor and Professor Emeritus, National Museum of Ethnology, Japan |
| 1993 | Professor Emeritus, the Graduate University for Advanced Studies |
| 1996 | Professor Emeritus, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1988 | Commandeur, Ordre des Palmes Académiques, France |
| 1988 | Medal with Purple Ribbon, Japan |
| 1991 | Person of Cultural Merit, Japan |
| 1999 | Grand Cordon of Order of the Sacred Treasure, Japan |

# Order of Culture, Japan 2003

***Japanese Government***

Physics

**Awarded for**

his contribution to the formulation of the Gell-Mann-Nishijima formula in particle physics

## Kazuhiko Nishijima [ *1926 - 2009* ]

Doctor of Science

Professor Emeritus, the University of Tokyo and Kyoto University

Kazuhiko Nishijima

## Achievements

Professor Nishijima contributed significantly to particle physics research. He studied the physics of strange particles and introduced the quantum number, "strangeness." In 1953, he related the baryon number, strangeness, and isospin of hadrons to the electric charge of a particle. This concept is currently expressed in the Gell-Mann-Nishijima formula. The concept of strangeness had been generalized as a flavor, which became recognized as one of the fundamental quantum numbers in modern particle physics. He also contributed greatly to the development of field theory.

## Profile

Apart from his pioneering work in particle physics, Kazuhiko Nishijima was known to deliver clear and extremely intellectual lectures. One can learn their atmosphere in many textbooks written by him. In addition, he not only fostered many brilliant students at the University of Tokyo but also strived to cultivate students in developing countries as a director of the Nishina Memorial Foundation. His unique personality won the sympathy of many other physicists, and they had been supported spiritually by him.

**Timeline**

| | |
|---|---|
| 1948 | Graduated from the University of Tokyo Faculty of Science |
| 1950 | Assistant Professor, Osaka City University |
| 1955 | Received Doctor of Science from Osaka University |
| 1959 | Associate Professor, Osaka City University |
| 1961 | Professor, the University of Illinois at Urbana-Champaign |
| 1966 | Professor, the University of Tokyo |
| 1979 | Dean, Faculty of Science, the University of Tokyo |
| 1986 | Professor and Director, Yukawa Institute of Theoretical Physics, Kyoto University |
| 1990 | Retired from Kyoto University and entitled Professor Emeritus |
| 1990 | Professor, Chuo University (-1997) |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1993 | Person of Cultural Merit, Japan |

# Order of Culture, Japan 2005

***Japanese Government***

Agriculture

**Awarded for**

his contribution to the development of irrigation, drainage, and reclamation engineering

## Toshio Sawada [ *1919 -* ]

Doctor of Agriculture
Professor Emeritus, Kyoto University
The 20th President of Kyoto University

Toshio Sawada

## Achievements

Professor Sawada was decorated with the Order of Culture for his theoretical and practical achievements in designing dams, water canals, and reclamation facilities for irrigation. In particular, he established a design method to reinforce dams by mixing rocks and concrete, which has been widely applied in dam construction throughout Japan. He has also received other prestigious awards from academic societies in Japan, including the Japanese Society of Irrigation, Drainage and Reclamation Engineering as well as the Association of Japanese Agricultural Scientific Societies.

## Profile

Toshio Sawada was the 20th president of Kyoto University (1979-1985). After his retirement, he served as president of the Japan Society for the Promotion of Science, and also as a member of the Japan Academy.

**Timeline**

| | |
|---|---|
| 1950 | Associate Professor, Kyoto University |
| 1955 | Received Doctor of Agriculture from Kyoto University |
| 1959 | Professor, Kyoto University |
| 1971 | Dean, Faculty of Agriculture, Kyoto University |
| 1979 | President, Kyoto University (-1985) |
| 1985 | Professor Emeritus, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1986 | Verdienstorden der Bundesrepublik Deutschland, German Government, Germany |
| 1987 | Japan Academy Prize, the Japan Academy, Japan |
| 1994 | Person of Cultural Merit, Japan |
| 2003 | International Society of Paddy and Water Environment Engineering Award, International Society of Paddy and Water Environment Engineering, Japan |

# Order of Culture, Japan 2009

***Japanese Government***

*Medicine, Virology*

**Awarded for**
his contribution to microbiology

## Yorio Hinuma [ *1925 -* ]

M.D. and Ph.D. in Medicine
Professor Emeritus, Tohoku University,
Kumamoto University and Kyoto University

Yorio Hinuma

## Achievements

Professor Hinuma was conferred with the Order of Culture for his discovery of a retrovirus called the human T-lymphotropic virus type I (HTLV-I), which causes adult T cell leukemia. This finding supported the hypothesis that viral infection of cells cause human cancer, and thereby opened a new field in cancer research.

## Profile

Yorio Hinuma was a pediatrician who later became a virologist to understand the mechanism of virus-derived leukemia. After graduating from Tohoku University, he served as a research fellow at the Children's Hospital of Philadelphia, USA. He joined the Institute for Virus Research at Kyoto University in 1980. After retirement from Kyoto University, he was appointed as an executive member of the pharmaceutical company, Shionogi & Co., Ltd..

**Timeline**

| | |
|---|---|
| 1950 | Graduated from Tohoku University Faculty of Medicine, M.D. |
| 1954 | Assistant Professor, Tohoku University |
| 1957 | Received Doctor in Medicine from Tohoku University |
| 1958 | Research Fellow, the Children's Hospital of Philadelphia |
| 1960 | Associate Professor, Tohoku University |
| 1965 | Visiting Scholar, Roswell Park Memorial Institute, USA |
| 1968 | Professor, Tohoku University |
| 1971 | Professor, Kumamoto University |
| 1980 | Professor, Institute for Virus Research, Kyoto University |
| 1988 | Retired from Kyoto University and entitled Professor Emeritus |
| 1988 | Director, Shionogi Pharmaceutical Research Center, Shionogi & Co. Ltd. |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1986 | Person of Cultural Merit, Japan |
| 1989 | Japan Academy Prize, the Japan Academy, Japan |

# Order of Culture, Japan 2011

***Japanese Government***

*Molecular Biology*

**Awarded for**
explaining eukaryotic cell cycles and chromosome partitioning

## Mitsuhiro Yanagida [ *1941 -* ]

Doctor of Science
Professor, Okinawa Institute of Science and Technology Graduate University
Professor Emeritus, Kyoto University

Mitsuhiro Yanagida

## Achievements

Professor Yanagida unraveled the mechanisms of eukaryotic cell cycle with a focus on chromosome partitioning. In his early work, he used bacteriophages and electron microscope to shed light on DNA structure, and then changed his research objective to focus on fission yeast for further analysis of chromosome and cell division. He employed a genetic method to identify genes in the cell cycle as well as fluorescent microscopic technology to stain chromosome DNA. His presentation of the dynamic movement of fluorescent-stained chromosomes during cell division with video image offered a significant visual impact to molecular biologists. His study of centromere and its regulating genes revealed the big picture of cell cycle, which contains many universal mechanisms seen in higher organisms, including humans. Yanagida continues his research to obtain a deeper understanding of the cell cycle.

## Profile

Mitsuhiro Yanagida is an enthusiastic molecular biologist whose research focuses on the cell cycle. After graduating from the University of Tokyo, he pursued research at the University of Geneva and University of Maryland. He was appointed as a professor at Kyoto University when he was 37 years old, and then he started his research on chromosomes and the cell cycle using fission yeast. He has mentored many students from his laboratory to shape them into talented molecular biologists.

**Timeline**

| | |
|---|---|
| 1964 | Graduated from the University of Tokyo Faculty of Science |
| 1967 | Research Assistant, the University of Geneva |
| 1970 | Received Doctor of Science from the University of Tokyo |
| 1971 | Associate Professor, Kyoto University |
| 1978 | Professor, Faculty of Science, Kyoto University |
| 1999 | Professor, Graduate School of Biostudies, Kyoto University |
| 2004 | Retired from Kyoto University and entitled Professor Emeritus |
| 2004 | Specially-Appointed Professor, Graduate School of Life Sciences, Kyoto University |
| 2011 | Professor, Okinawa Institute of Science and Technology Graduate University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2000 | Foreign Member, the Royal Society, UK |
| 2002 | Medal with Purple Ribbon, Japan |
| 2003 | Imperial Prize and Japan Academy Prize, the Japan Academy, Japan |
| 2004 | Person of Cultural Merit, Japan |
| 2010 | Honorary Fellow, the Society of Biology, UK |
| 2012 | Foreign Associate, National Academy of Science, USA |

# Order of Culture, Japan 2012

***Japanese Government***

Photo: Nara Institute of Science and Technology

*Agriculture, Plant Cell Biology*

**Awarded for**

his research on molecular cell biology and plant biotechnology

## Yasuyuki Yamada [ *1931 -* ]

Doctor of Agriculture
Member of the Japan Academy
Professor Emeritus, Kyoto University, Nara Institute of Science and Technology, and Zhejiang University of Technology

Yasuyuki Yamada

## Achievements

Working with plant culture systems, Professor Yamada opened up a new area of plant research and has made several outstanding contributions to our understanding of the functional expression and biosynthesis of secondary metabolites in higher plants. Furthermore, he established a novel experimental, large scale culture system for the production of alkaloids from plants.

## Profile

Yasuyuki Yamada gained his doctorate at Kyoto University and was a Fullbright Research Fellow at Michigan State University from 1962 to 1965. Professor Yamada is the recipient of many awards and honors, among them the Academy Prize from the Japanese Academy, as well as membership in that society. He is an elected foreign member of both the Swedish Royal Society of Sciences and the National Academy of Sciences, USA. He also has received the Japanese national award "Person of Cultural Merit" (Bunka Korosha), and the highest citizen's award, the "Order of Culture" (Bunka Kunsho).

**Timeline**

| | |
|---|---|
| 1962 | Fulbright Program Fellow, Michigan State University, USA |
| 1963 | Received Doctor of Agriculture from Kyoto University |
| 1967 | Associate Professor, Kyoto University |
| 1982 | Professor, Kyoto University |
| 1985 | Adjunct Professor, Osaka University |
| 1986 | Science Advisor, Ministry of Education, Science, Sport and Culture, Japan |
| 1994 | Professor, Nara Institute of Science and Technology |
| 1995 | Professor Emeritus, Kyoto University |
| 1995 | Member, the Japan Academy |
| 1997 | President, Nara Institute of Science and Technology |
| 2001 | Professor Emeritus, Nara Institute of Science and Technology |
| 2004 | Professor Emeritus, Zhejiang University of Technology, China |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1989 | Honorary Doctorate, Uppsala University, Sweden |
| 1991 | Japan Academy Prize, the Japan Academy, Japan |
| 1994 | Foreign Member, Royal Society of Sciences, Sweden |
| 1999 | Foreign Associate, National Academy of Science, USA |
| 1999 | Person of Cultural Merit, Japan |
| 2001 | Honorary Doctorate, Michigan State University, USA |

Chapter

8

VIII

## Imperial Prize of the Japan Academy

*"The Imperial and Japan Academy Prizes are awarded to persons who have achieved notable research landmarks or who have authored particularly outstanding academic papers or books. Conferring these prizes on such persons is one of the Academy's most important functions. For them, an award ceremony has been held every year since 1911, with 2013 marking the 103rd such ceremony. Since 1949, the ceremony has been graced by the presence of His Majesty the Emperor of Japan. Then from 1990, both the Emperor and Empress have attended." (The Japan Academy site: www.japan-acad.go.jp)*

# Awardees of Both the Imperial Prize and the Japan Academy Prize at Kyoto University

The following is a list of Kyoto University researchers who have received both the Imperial Prize and the Japan Academy Prize of the Japan Academy since 1949. Only the four Laureates shown in bold are profiled in this chapter due to limitations of space. The other awardees will be introduced in a revised edition.

| Year | Laureate | Title at the time of receiving the Award | Award Topic |
|---|---|---|---|
| 2012 | Kazuyoshi Yoshikawa (see p. 70) | Professor, Graduate School of Letters | *Proust et l'art pictural* |
| 2010 | Shinya Yamanaka (see p. 16) | Professor, The Center for iPS Cell Research and Application | The Generation of Induced Pluripotent Stem (iPS) Cells |
| 2009 | **Tohru Eguchi** | Professor, Yukawa Institute for Theoretical Physics | Study of Elementary Particle Theory based on Methods of Mathematical Physics |
| 2008 | **Keiji Morokuma** | Research Leader, Fukui Institute for Fundamental Chemistry | Theoretical Studies of Design of Structure, Function and Reactivity of Molecules |
| 2006 | Shuh Narumiya (see p. 62) | Professor, Graduate School of Medicine | Studies on the Prostaglandin Receptors |
| 2005 | **Kazuya Kato** | Professor, Graduate School of Science | Research on Arithmetic Geometry |
| 2003 | Mitsuhiro Yanagida (see p. 80) | Professor, Graduate School of Biostudies | Regulation of Cell Cycle and Chromosome Segregation |
| 2000 | Shigekazu Nagata (see p. 61) | Professor, Osaka University | Studies on Molecular Mechanism of Apoptosis |
| 1999 | **Susumu Fuma** | Professor, Graduate School of Letters | A Study of Benevolent Societies and Benevolent Halls in China |
| 1997 | Shigetada Nakanishi (see p. 55) | Professor, Graduate School of Medicine | Studies on Molecular Mechanisms of Neurotransmission |
| 1996 | Tasuku Honjo (see p. 57) | Professor, Graduate School of Medicine | Studies on Regulation of Immunoglobulin Class Switching |
| 1994 | Makoto Kumada (see p. 35) | Professor Emeritus of Kyoto University | Studies on Organosilicon Chemistry (Joint Research) |
| 1989 | Tomi Saeki | Professor Emeritus of Kyoto University | Studies on the History of Salt Administration in China |
| | Yorio Hinuma (see p. 79) | Professor Emeritus of Kyoto University | Studies on Viral Etiology of Adult T Cell Leukemia |
| 1978 | Kiyosi Itô (see p. 19) | Professor, Research Institute for Mathematical Science | A Study of Stochastic Differential Equations |
| 1974 | Kimishige Ishizaka (see p. 29) | Professor, The Johns Hopkins University and Kyoto University | Discovery of Immunoglobulin E and Mechanism of Reagin Type Allergy |
| 1971 | Chushiro Hayashi (see p. 27) | Professor, Faculty of Science | Nuclear Synthesis and Stellar Evolution |
| 1970 | Seizo Okamura | Professor, Research Reactor Institute | Studies on Radiation-Induced Polymerization |
| 1968 | Tatsuo Nishida | Professor, Faculty of Letters | A Study of the Hsi-Hsia Language |
| 1956 | Masuzo Shikata, Isamu Tachi | | Studies on Polarography |
| 1954 | Jitsuzo Tamura, Yukio Kobayashi | | Tombs and Mural Paintings of Ch'ing-Ling. Liao Imperial Mausoleums of Eleventh Century A.D. in Eastern Mongolia |

# Imperial Prize 1999

## The Japan Academy

History

**Awarded for**

his historical studies of benevolent societies in China

## Susumu Fuma [ 1948 - ]

Doctor of Letters
Professor Emeritus, Kyoto University

Susumu Fuma

### Achievements

Professor Fuma focuses on Chinese social history during the Ming and Qing periods. His book "*Benevolent Societies and Benevolent Halls in China*" looks into the history of local charity institutions run by private citizens until the era of the Chinese Communist Party. He received the Imperial Prize in 1999 for his detailed research on the systems of welfare and local governance in pre-modern China.

### Profile

Susumu Fuma joined the Faculty of Letters at Kyoto University in 1987 after spending seven years at Toyama University. His research covers a wide range of topics, including the history of Chinese diplomacy and cultural exchange in East Asia.

**Timeline**

| | |
|---|---|
| 1974 | Graduated from Kyoto University Graduate School of letters |
| 1974 | Research Associate, Kyoto University |
| 1979 | Lecturer, Toyama University |
| 1981 | Associate Professor, Toyama University |
| 1987 | Associate Professor, Kyoto University |
| 1995 | Professor, Kyoto University |
| 1997 | Received Doctor of Letters from Kyoto University |
| 2013 | Retired from Kyoto University and entitled Professor Emeritus |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1999 | Japan Academy Prize, the Japan Academy, Japan |

# Imperial Prize 2005

## The Japan Academy

Photo: not available

Mathematics

**Awarded for**

research on arithmetic geometry

## Kazuya Kato [ 1952 - ]

Doctor of Science
Professor, Chicago University
Professor Emeritus, the University of Tokyo

Kazuya Kato

### Achievements

The achievements of Professor Kato span many branches of number theory and geometry. Particularly, his results on Iwasawa theory of modular forms are highly valued for their originality and influence. This remarkable achievement has yielded significant progress in Birch-Swinnerton-Dyer conjecture, which describes number theoretical objects via L-functions. He has also greatly contributed to higher dimensional class field theory, $p$-adic Hodge theory, logarithmic algebraic geometry, and ramification theory for algebraic varieties.

### Profile

Kazuya Kato has been leading the world of arithmetic and algebraic geometry over the years. His deep insights and unique humanity have attracted many mathematicians and other scholars. He sometimes makes efforts to share complicated mathematical concepts and stories in arithmetic algebraic geometry using metaphors from folktales and poems. An example is his song on prime numbers, which is included in the special volume of *Documenta Mathematica* published in honor of his 50th birthday. This song is increasingly gaining renown.

**Timeline**

| | |
|---|---|
| 1980 | Received Doctor of Science from the University of Tokyo |
| 1982 | Lecturer, the University of Tokyo |
| 1984 | Associate Professor, the University of Tokyo |
| 1990 | Professor, the University of Tokyo |
| 1992 | Professor, Tokyo Institute of Technology |
| 1997 | Professor, the University of Tokyo |
| 2001 | Professor, Kyoto University |
| 2009 | Professor, the University of Chicago |
| 2012 | Professor Emeritus, the University of Tokyo |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 2005 | Japan Academy Prize, the Japan Academy, Japan |

# Imperial Prize 2008

## The Japan Academy

Theoretical Chemistry

**Awarded for**

his scientific achievements in uncovering the structure, function, and reactivity of molecules by using theoretical and computational approaches

## Keiji Morokuma [1934 - ]

Doctor of Engineering
Professor Emeritus, Emory University, Institute for Molecular Science, and Graduate University for Advanced Studies
Senior Research Fellow, Fukui Institute for Fundamental Chemistry, Kyoto University

Keiji Morokuma

### Achievements

Professor Morokuma is a leading scholar in the development and application of theoretical and computational methods for chemistry. His research covers a wide range of topics in quantum chemistry and molecular science, including development of the Kitaura-Morokuma energy analysis for molecular interaction, and theoretical studies of catalytic reactions, photochemical reactions and carbon nanostructures, as well as development of the so-called our own n-layered integrated molecular orbital and molecular mechanics method, popularly known as ONIOM. This method deals with chemical reactions of complex molecular systems and has been applied widely in the field of chemistry.

### Profile

After obtaining his D. Eng. degree from Kyoto University under Professor Kenichi Fukui (see p.11), 1981 Nobel Laureate in Chemistry, Keiji Morokuma pursued his academic career in both the U.S. and Japan. He has authored over 780 scientific publications and received numerous scientific awards. He remains active as a Senior Research Fellow at the Fukui Institute for Fundamental Chemistry at Kyoto University.

**Timeline**

| | |
|---|---|
| 1962 | Assistant Professor, Kyoto University |
| 1963 | Received Doctor of Engineering from Kyoto University |
| 1964 | Research Fellow of Fulbright Scholarship, Columbia University |
| 1967 | Assistant Professor, the University of Rochester |
| 1971 | Professor, the University of Rochester |
| 1976 | Professor, Institute for Molecular Science, Japan |
| 1978 | Director, Computer Center, Institute for Molecular Science, Japan |
| 1993 | Director, Cherry L. Emerson Center for Scientific Computation and William H. Emerson Professor, Department of Chemistry, Emory University |
| 2006 | Professor Emeritus, Emory University |
| 2006 | Research Leader, Fukui Institute for Fundamental Chemistry, Kyoto University |
| 2012 | Senior Research Fellow, Fukui Institute for Fundamental Chemistry, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1978 | Award, International Academy of Quantum Molecular Science |
| 1991 | The Chemical Society of Japan (CSJ) Award, The Chemical Society of Japan, Japan |
| 1993 | Schrödinger Medal, The World Association of Theoretical and Computational Chemists |
| 2005 | Fukui Medal, Asia-Pacific Association of Theoretical and Computational Chemists |
| 2008 | Japan Academy Prize, the Japan Academy, Japan |
| 2012 | Person of Cultural Merit, Japan |

# Imperial Prize 2009

## The Japan Academy

Particle Physics

**Awarded for**

his study of elementary particle theory based on methods of mathematical physics

## Tohru Eguchi [1948-]

Doctor of Science
Professor, Rikkyo University
Professor Emeritus, the University of Tokyo and Kyoto University

Tohru Eguchi

### Achievements

Professor Eguchi has contributed to various mathematical aspects of particle physics as a theoretical physicist. One of his remarkable results is the discovery of Eguchi-Hanson space in his collaboration with Professor Andrew J. Hanson. This breakthrough is referred to as asymptotically locally Euclidean space by the work of Professors Gary W. Gibbons and Stephen W. Hawking. Professor Eguchi also produced important results on gauge theory, conformal field theory, and topological string theory. In particular, "Virasoro conjecture," which he proposed together with Professors Kentaro Hori and Chuan-Sheng Xiong, has significantly influenced related areas in mathematics, and has been proven by mathematicians.

### Profile

Tohru Eguchi has been leading not only many theoretical physicists but also mathematicians in the world. Apart from his great academic achievements, he has endeavored to bridge physics and mathematics, thereby influencing many mathematicians who are at the forefront of their fields. He has also produced plenty of brilliant disciples, and they have been playing important roles in international academic communities.

**Timeline**

| | |
|---|---|
| 1975 | Received Doctor of Science from the University of Tokyo |
| 1975 | Research Fellow, the University of Chicago and Stanford |
| 1978 | Assistant Professor, the University of Chicago |
| 1980 | Associate Professor, the University of Tokyo |
| 1991 | Professor, the University of Tokyo |
| 2007 | Director, Yukawa Institute for Theoretical Physics, Kyoto University |
| 2008 | Professor Emeritus, the University of Tokyo |
| 2012 | Professor, Rikkyo University |
| 2012 | Professor Emeritus, Kyoto University |

**Other Awards and Prizes (selected)**

| | |
|---|---|
| 1980 | Silver Prize, Gravity Research Foundation, USA |
| 2009 | Japan Academy Prize, the Japan Academy, Japan |

*Main Building of the Original Department of Science (completed in 1914)*

# A Brief History of Kyoto University

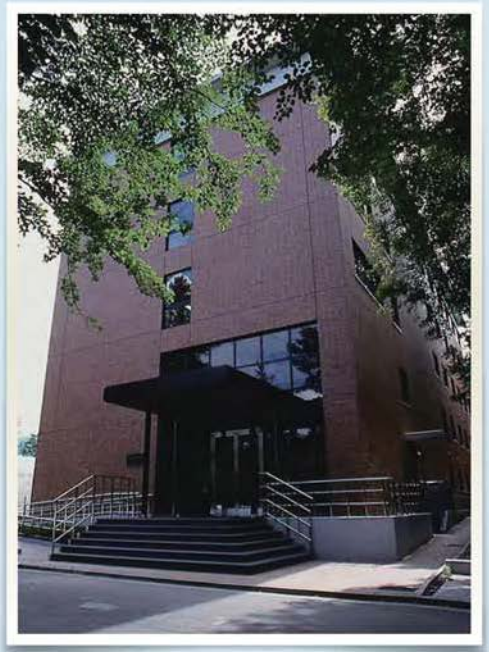
| | |
|---|---|
| 1897 | Founded as Kyoto Imperial University. |
| | College of Science and Engineering established. |
| 1899 | Colleges of Law and Medicine established. |
| | University Library and University Hospital established. |
| 1906 | College of Letters established. |
| 1914 | College of Science and Engineering divided into College of Science and College of Engineering. |
| 1919 | Colleges reorganized into five faculties under the new University Ordinance. |
| | Faculty of Economics established. |
| 1923 | Faculty of Agriculture established. |
| 1926 | Institute for Chemical Research established. |
| 1939 | Institute for Research in Humanities established. |
| 1941 | Chest Disease Research Institute and Institute of Atomic Energy established. |
| 1944 | Wood Research Institute established. |
| 1946 | Research Institute for Food Science established. (-2001) |
| 1947 | Renamed Kyoto University. |
| 1949 | Reorganized on four-year schooling basis (with the exception of six years for medicine) under the new education system. |
| | Faculty of Education established. |
| | Branch School established for general education of freshmen and sophomores. |
| 1951 | Disaster Prevention Research Institute established. |
| 1953 | Graduate courses under the new system were opened. |

*Faculty of Law and Faculty of Economics (completed in 1933), now known as the Main Building*

*Primate Research Institute Main Building (completed in 1968) and Experimental Area*

| | |
|---|---|
| 1953 | Yukawa Institute for Theoretical Physics established. |
| 1954 | Branch School renamed College of Liberal Arts and Sciences. |
| 1956 | Institute for Virus Research established. |
| 1960 | Faculty of Pharmaceutical Sciences established. |
| 1962 | Institute of Economic Research established. |
| 1963 | Research Institute for Mathematical Sciences and Research Reactor Institute established. |
| 1965 | Center for Southeast Asian Studies established. |
| 1966 | Center for Student Health established. |
| 1967 | Primate Research Institute established. |
| 1969 | Data Processing Center established. |
| 1971 | Radioisotope Research Center established. |
| 1972 | Research Center for Sports Science established. (-2003) |
| 1975 | College of Medical Technology established. (-2007) |
| 1976 | Plasma Physics Laboratory and Radiation Biology Center established. |
| 1977 | Environment Preservation Center and Center for Archaeological Operations established. |
| 1978 | Educational Center for Information Processing established. |
| 1980 | Research Center for Biomedical Engineering established. (-1998) |
| 1981 | Radio Atmospheric Science Center established. |
| 1986 | Center for African Area Studies established. |
| 1988 | Center for Molecular Biology and Genetics established. (-2004) |

*Molecular Biology Research Building (completed in 1993)*



*Research Building of the Yukawa Institute for Theoretical Physics (completed in 1995)*

| | |
|---|---|
| 1990 | Center for Student Exchange established. |
| 1991 | Graduate School of Human and Environmental Studies and Center for Ecological Research established. |
| 1992 | College of Liberal Arts and Sciences reorganized and renamed Faculty of Integrated Human Studies. |
| 1994 | Research Center for Higher Education established. |
| 1995 | Venture Business Laboratory established. |
| 1996 | Graduate School of Energy Science established. |
| | Institute of Atomic Energy and Plasma Physics Laboratory merged into the Institute of Advance Energy. |
| | Student Counseling Center established. (-1999) |
| 1997 | Kyoto University Museum established. |
| | The Educational Center for Information Processing reorganized and renamed Center for Information and Multimedia Studies. |
| 1998 | Graduate School of Asian and African Area Studies and Graduate School of Informatics established. |
| | Chest Disease Research Institute reorganized and renamed Institute for Frontier Medical Sciences. |
| 1999 | Graduate School of Biostudies and Counseling Center established. |
| 2000 | Radio Atmospheric Science Center reorganized and renamed Radio Science Center for Space and Atmosphere. |
| | University Archives established. |
| 2001 | International Innovation Center established. |
| | Center for Data Collection and Analysis established. (-2004) |
| 2002 | Graduate School of Global Environmental Studies established. |
| | Center for Data Processing and Center for Information and Multimedia Studies reorganized and renamed Academic Center for Computing and Multimedia Studies. |

*Graduate School of Human and Environmental Studies Building (completed in 1996)*

*Faculty of Engineering, Science Department Buildings*

2002 Research Center for Low Temperature and Materials Sciences and Fukui Institute for Fundamental Chemistry established.

2003 Seto Marine Biological Laboratory, University Forest, Subtropical Plant Institute and Fisheries Research Station merged into the Field Science Education and Research Center.
Research Center for Higher Education reorganized and renamed Center for the Promotion of Excellence in Higher Education.
Institute for the Promotion of Excellence in Higher Education and Law School established.
The College of Medical Technology merged into Graduate School of Medicine.

2004 Kyoto University incorporated in accordance with the National University Corporation Law.
Wood Research Institute and Radio Science Center for Space and Atmosphere unified as Research Institute for Sustainable Humanosphere.
Center for Southeast Asian Studies given Institute status.

2005 Organization for the Promotion of International Relations, Environment, Safety, and Health Organization, International Innovation Organization, Institute for Information Management and Communication, and Library Network established.
Center for Student Exchange reorganized and renamed International Center.

2006 School of Government established.
Graduate School of Management established.
Center for Integrated Area Studies established.
Institute of Sustainability Science established.

*The iCeMS research building near Hyakumanben*

*The Center for iPS Cell Research and Application (CiRA)*

Kyoto University Pioneering Research Unit for Next Generation established.
Center for Women Researchers established.

2007 Kokoro Research Center established.
Advanced Medical Engineering Research Unit established. (-2010)
International Innovation Organization reorganized and renamed Kyoto University Office of Society-Academia Collaboration for Innovation.
International Innovation Center reorganized and renamed Innovative Collaboration Center.
Institute for Integrated Cell-Material Sciences established.

2008 Wildlife Research Center established.
Center for Archaeological Operations reorganized and renamed Center for Cultural Heritage Studies.

2009 Young Researcher Development Center established.

2010 Center for the Promotion of Interdisciplinary Education and Research established.
Center for iPS Cell Research and Application established.
Micro/Nano Fabrication Hub in Kyoto University established.

2011 Radioisotope Research Center and Center for Student Health merged with Environment, Safety, and Health Organization.
Environment Preservation Center merged with Environment, Safety, and Health Organization.
International Center merged with Organization for the Promotion of International Relations.

2012 Young Researcher Development Center renamed the Hakubi Center for Advanced Research.

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**Kyoto University**

Kyoto University Research
Administration Office

**Issued**
July 2014



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KYOTO UNIVERSITY